Replacement Sheet

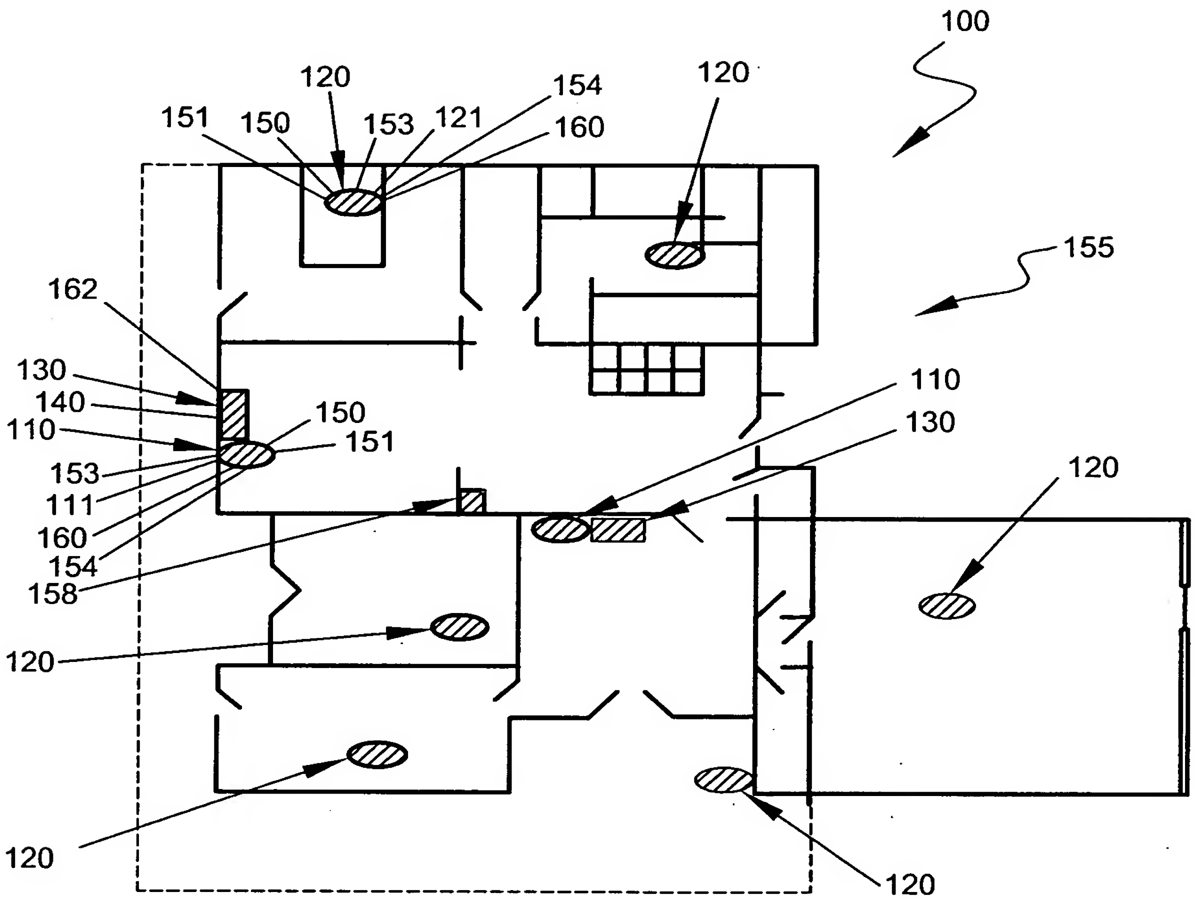


FIG. 1

Replacement Sheet

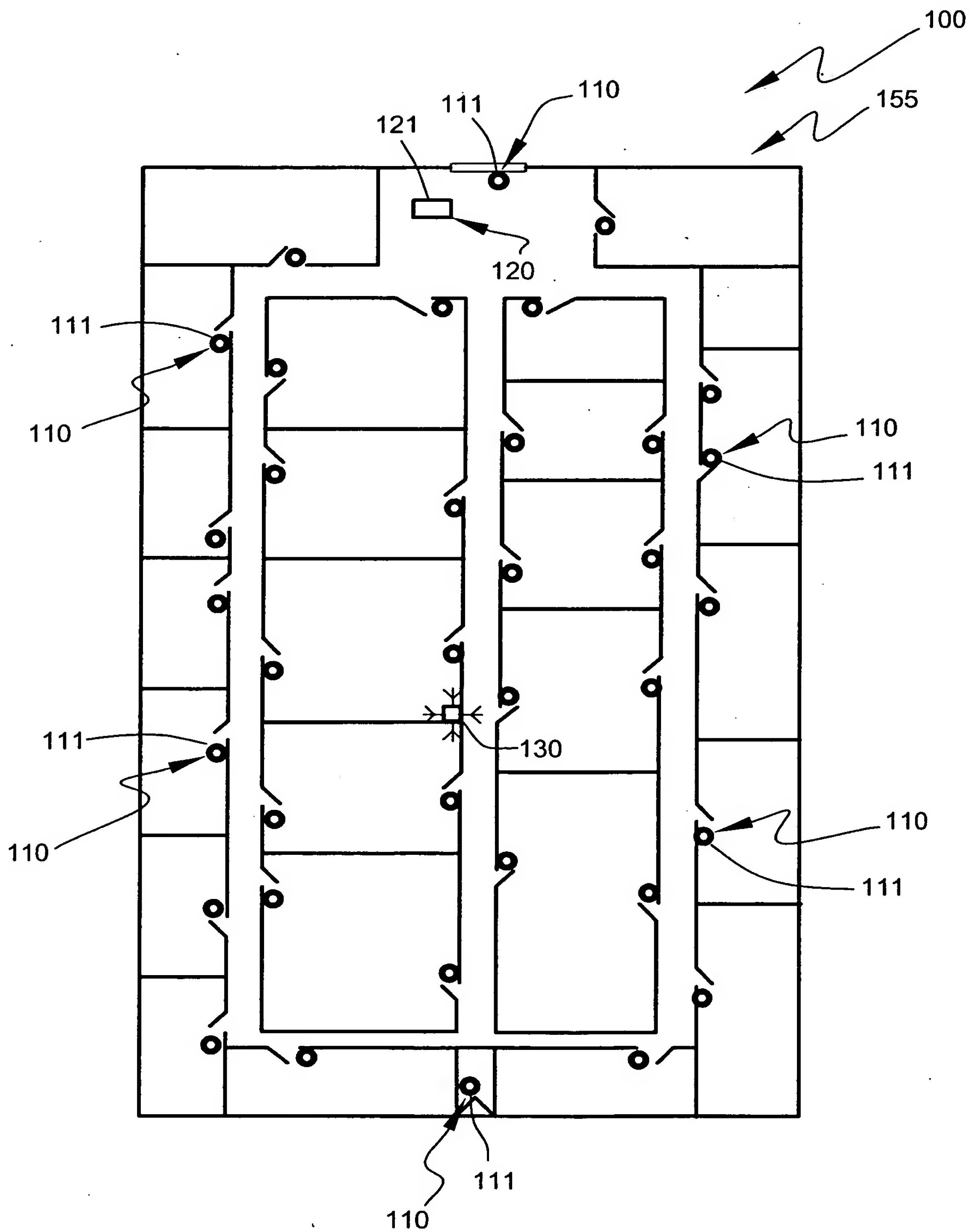


FIG. 2-00

Replacement Sheet

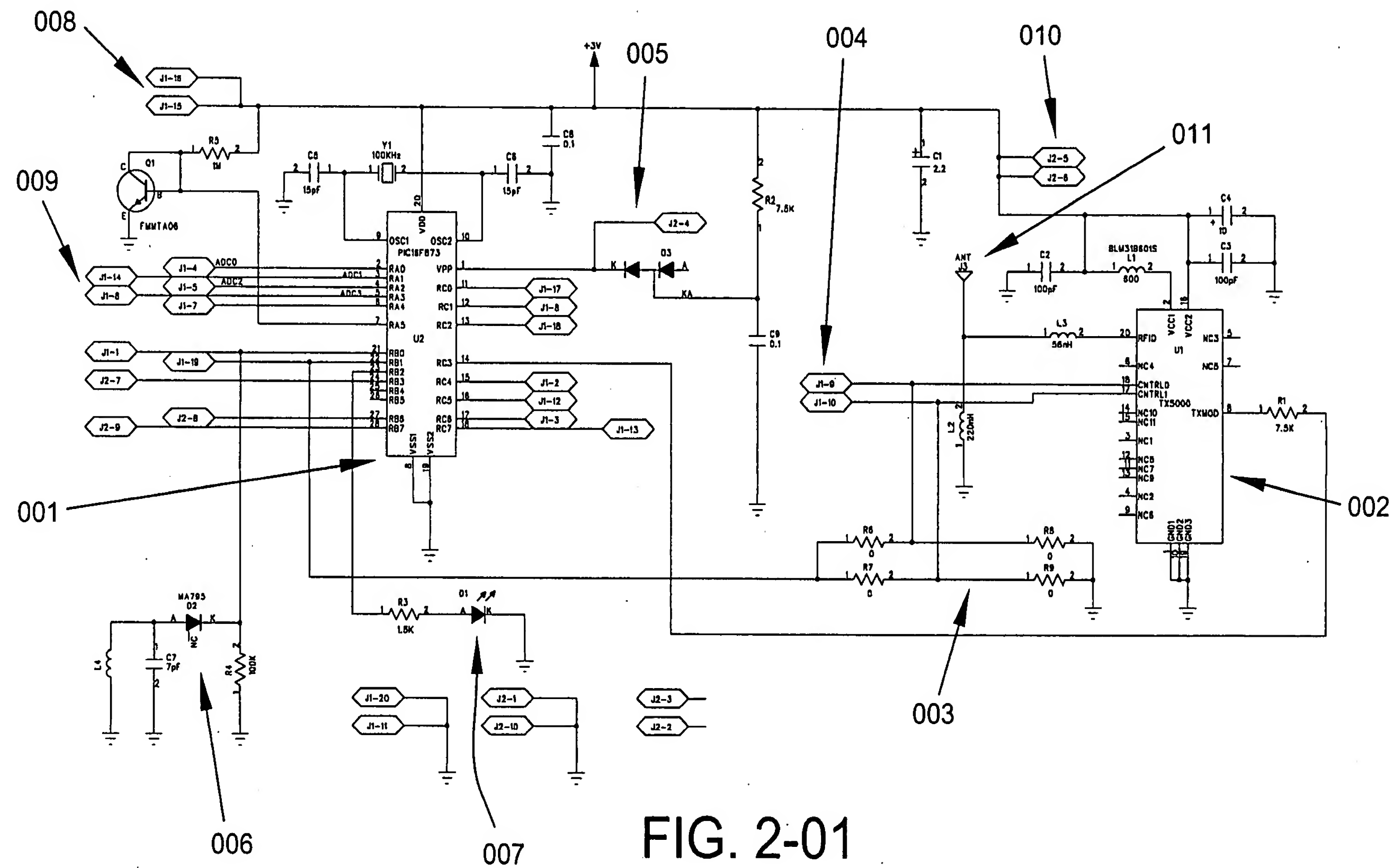


FIG. 2-01

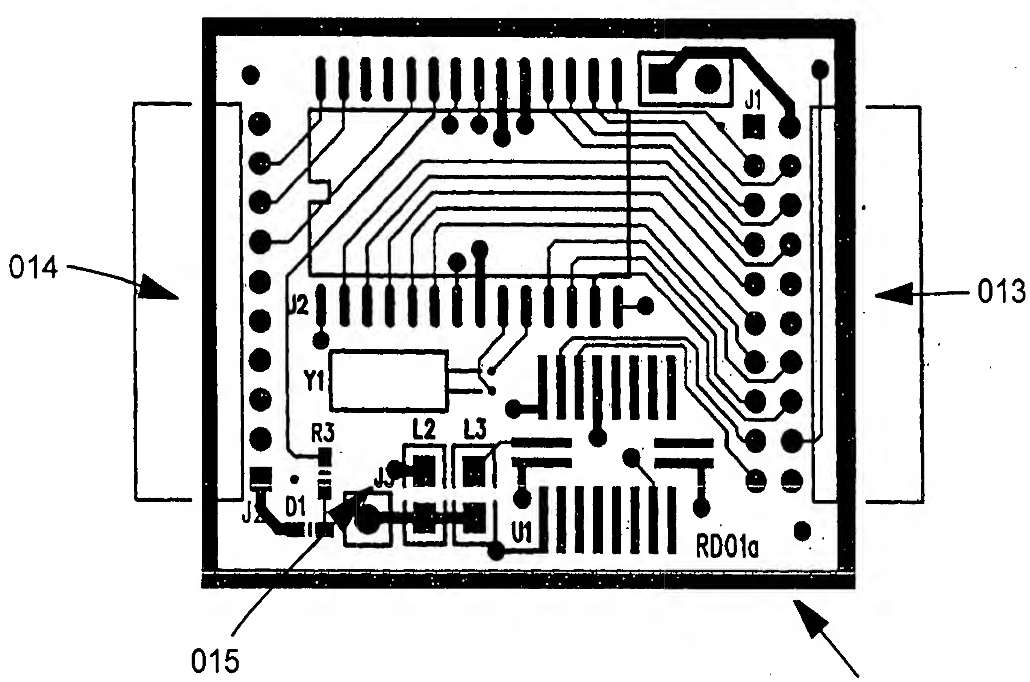


FIG. 2-02

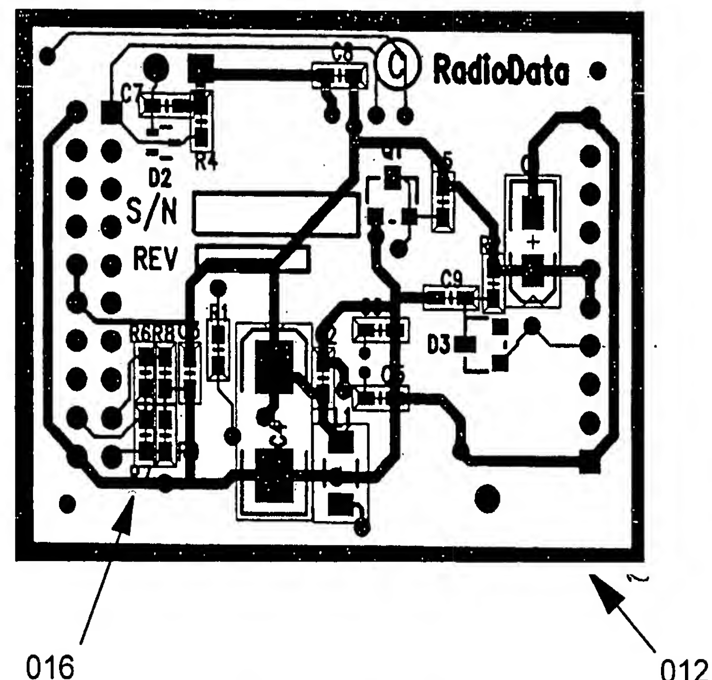
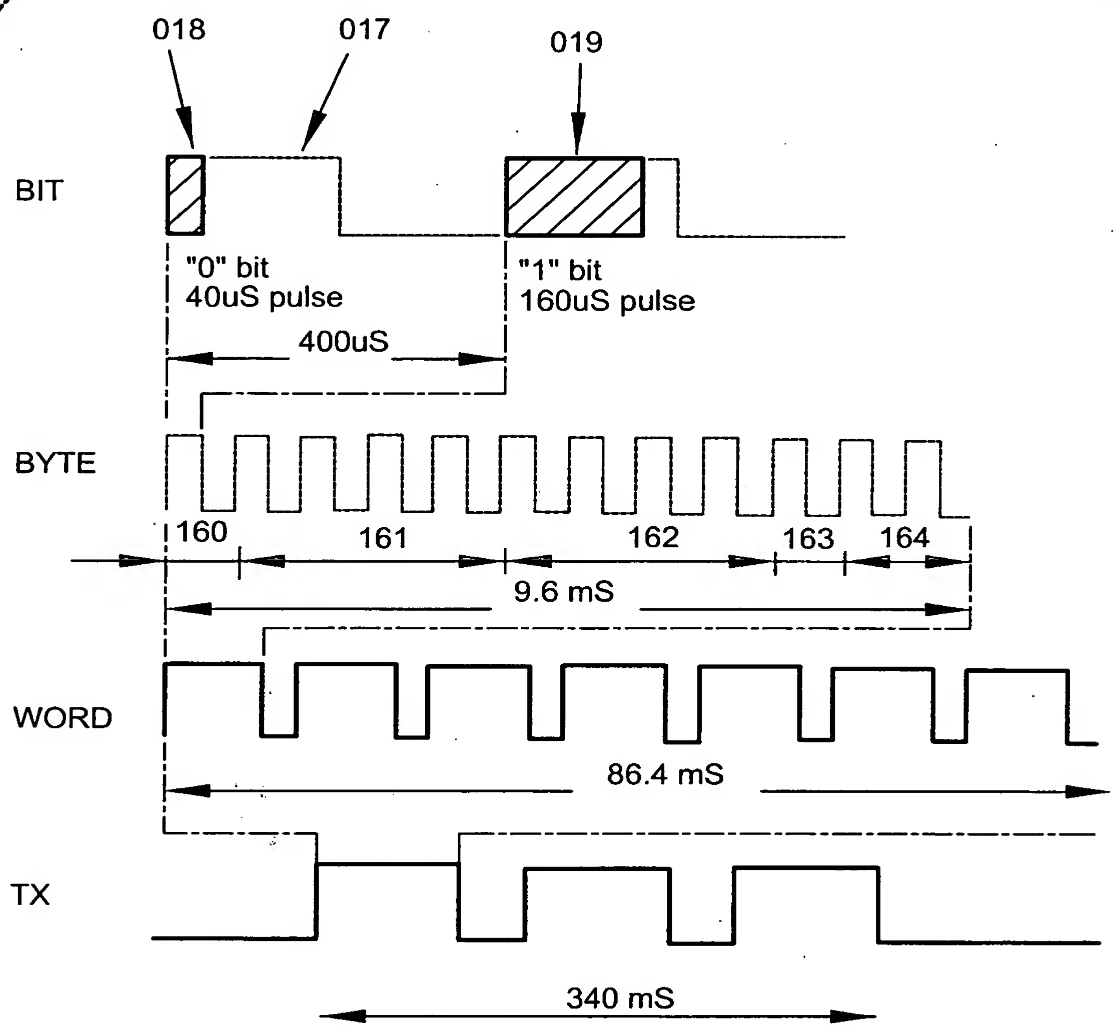


FIG. 2-03



160 Start bit
161 encoded charactures (i.e. identity code and teperture)
162 Encoded charactures (i.e. pressure and temperture)
163 Parity bit
164 Two stop bits

Resolution Examples

Voltage resolution 0.01 per bit (2.0 to 3.5V)
Pressure resolution 1 psi per bit (0 to 150psi)
Temperture resolution 1 C per bit (-25 to 125C)

FIG. 2-04

Transponder Coding for Near Term Applications (intervals are time slots,

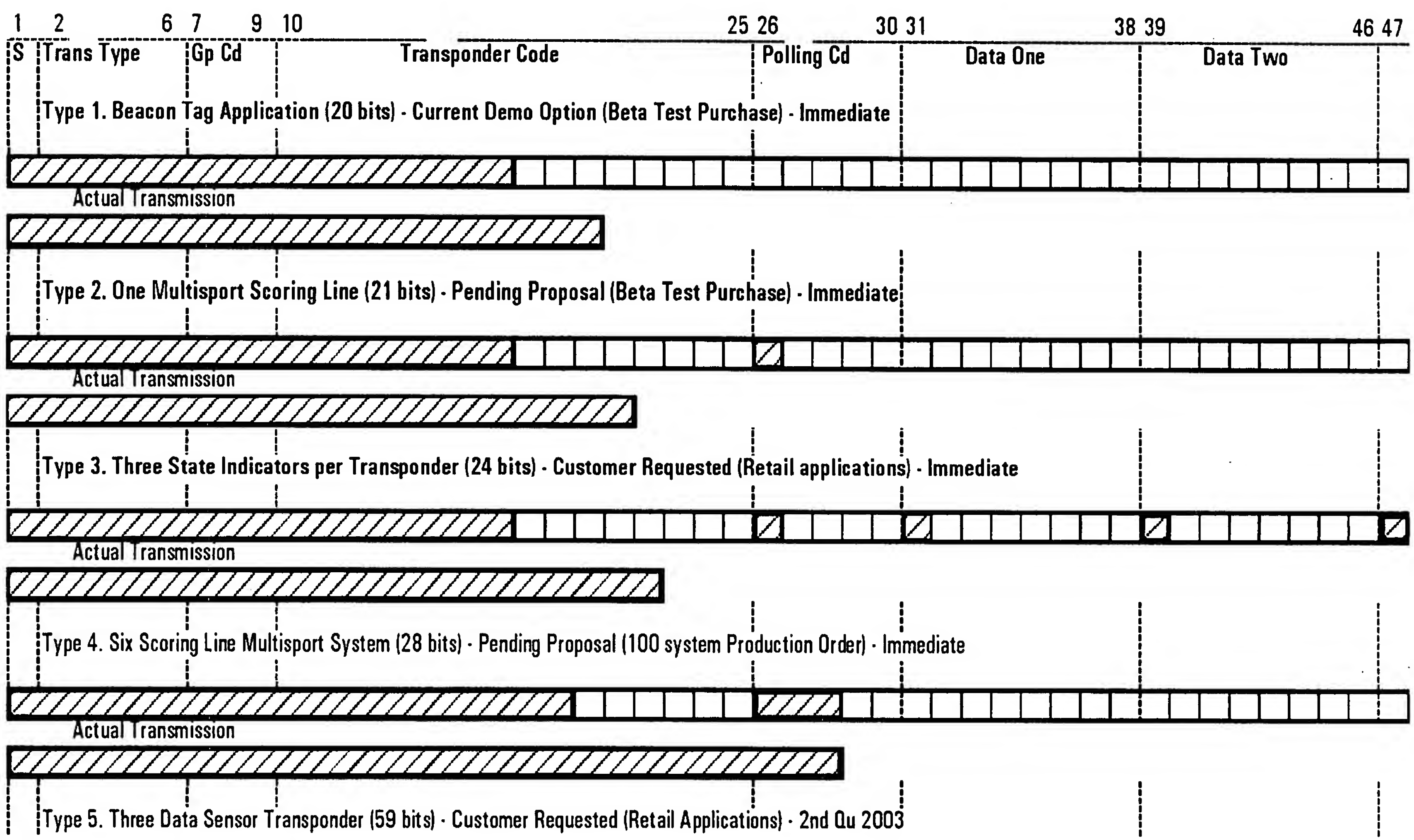
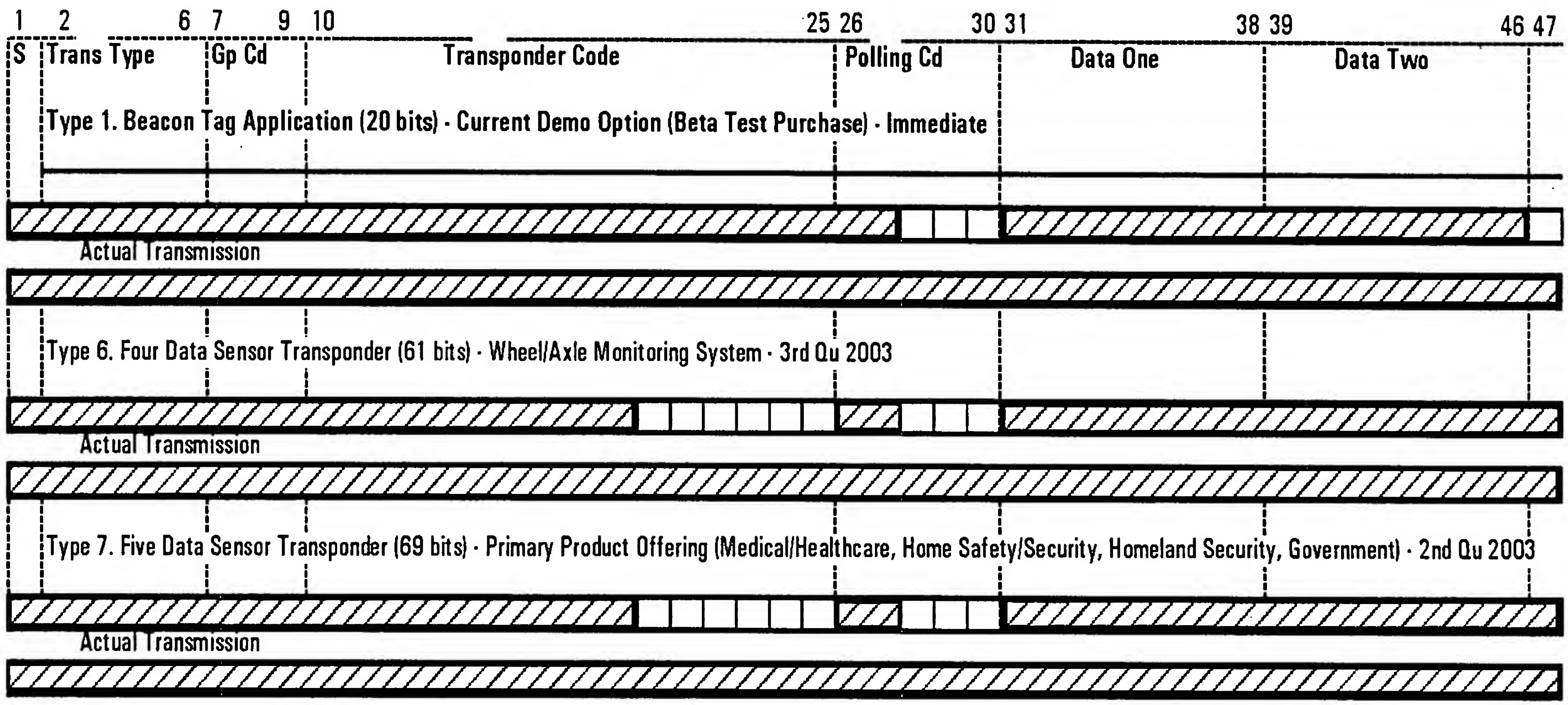


FIG. 2-05A



Modes

Sleep mode ⟶ Power up ⟶ Sample ⟶ Transmit ⟶ Sleep mode

Notes

Zero bit pulse width is 40uS for OOK (10uS for ASK). One bit pulse width is 160uS for OOK (40uS for ASK).

Pulse Time Slot is 200uS for OOK (50uS for ASK)

Transmit Time (OOK): A = 2.4mS+, B= 3.2mS+, C= 2.4mS+, D= 8.4mS+ and E= 10.4mS+. Three transmissions 10mS apart

Transmit Time (ASK): A = 0.6mS+, B= 0.8mS+, C= 0.6mS+, D= 2.1mS+ and E= 2.6mS+. Three transmission 2.5mS apart

If Transmissions are 10.5 seconds apart, OOK Duty Cycle is 0.20-0.66%, ASK is 0.05 to 0.16%.

Data Transponders have have very slow beacon rates except when anomalies are detected.

FIG. 2-05B

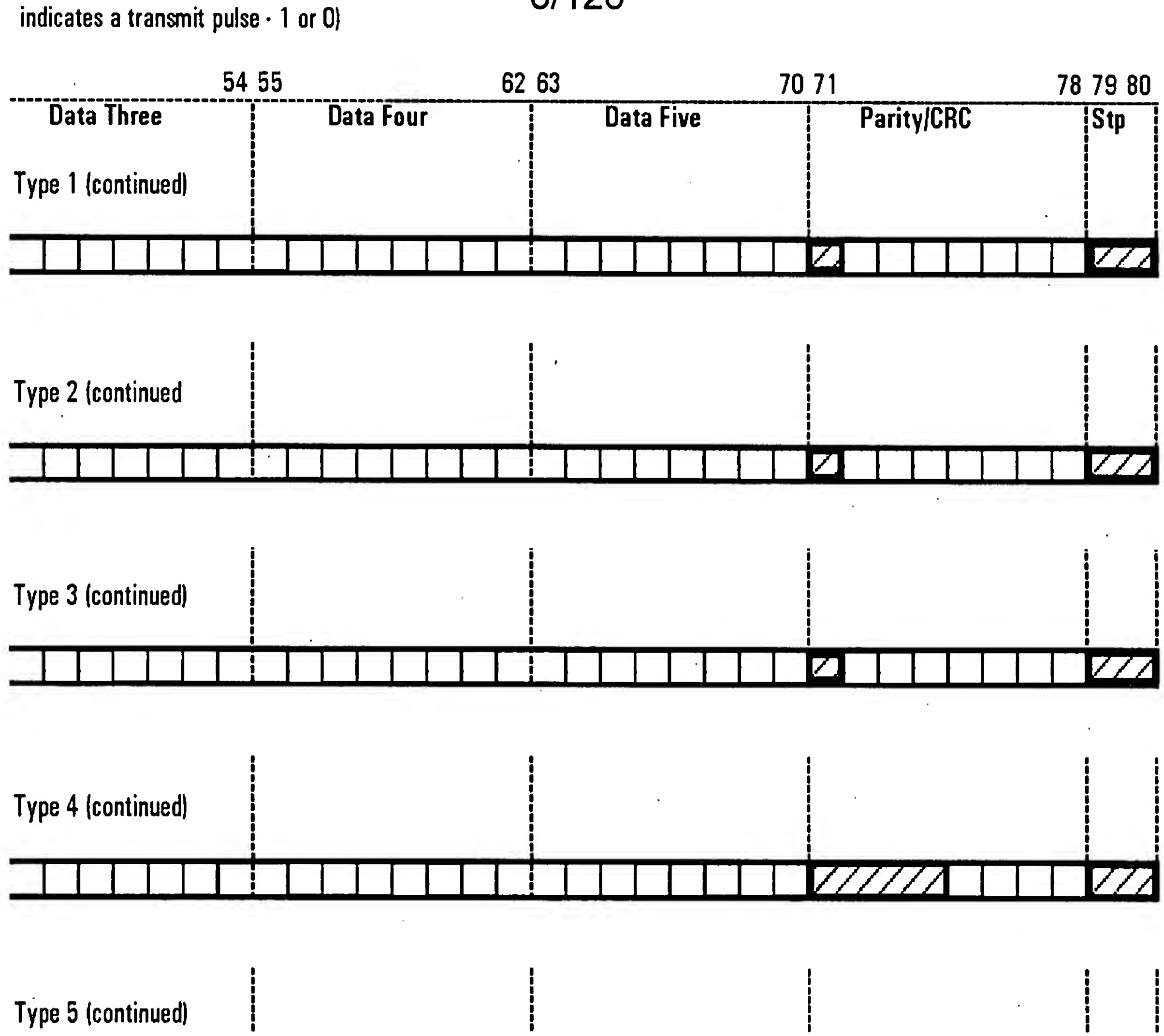

indicates a transmit pulse - 1 or 0)
54 55
62 63
70 71
78 79 80
Data Three
Data Four
Data Five
Parity/CRC
Stp
Type 1 (continued)
Type 2 (continued
Type 3 (continued)
Type 4 (continued)
Type 5 (continued)

FIG. 2-05C

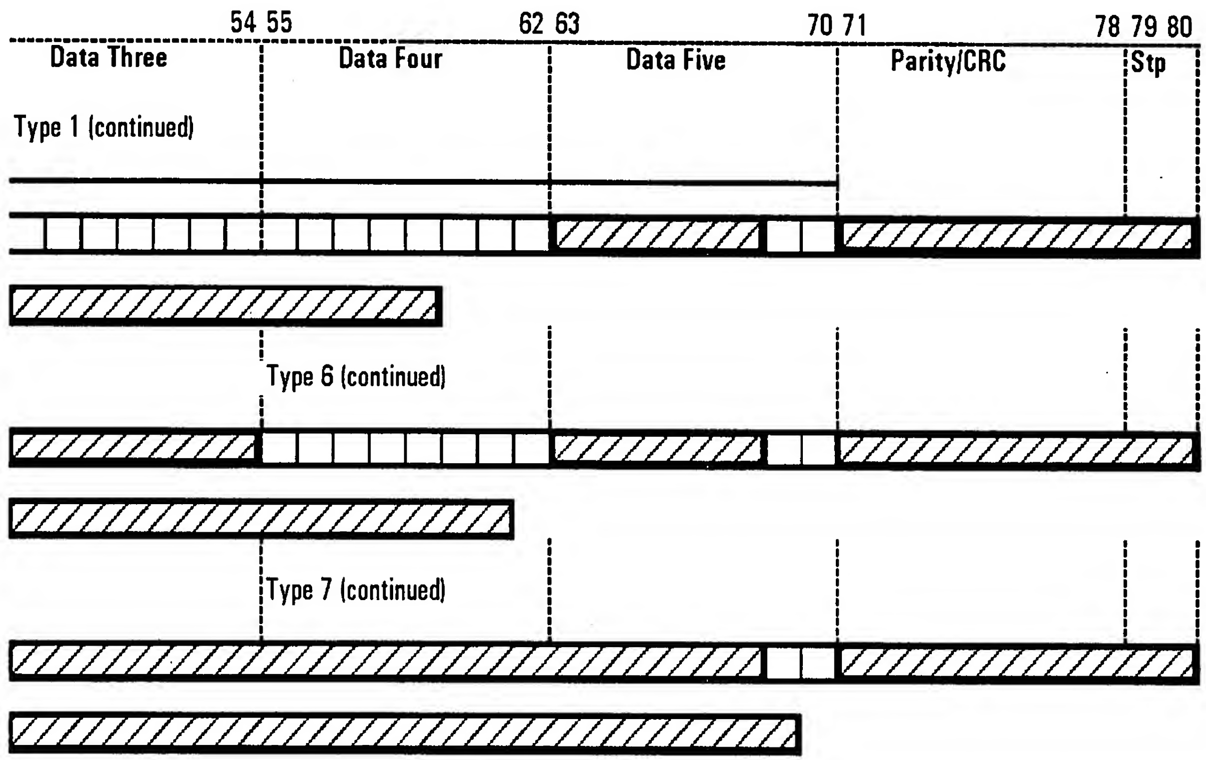

54 55
62 63
70 71
78 79 80
Data Three
Data Four
Data Five
Parity/CRC
Stp
Type 1 (continued)
Type 6 (continued)
Type 7 (continued)

FIG. 2-05D

RADIODATA APPLICATION DESCRIPTIONS TRANSPONDER FIRMWARE PROPOSAL

1. GENERIC TRANSPONDER FIRMWARE

A. ALL TRANSPONDERS REQUIRE A GROUP CODE. THIS CAN BE ONE OF TWO OPTIONS BUILDING TO 64 LATER IN 2003

B. ALL TRANSPONDERS REQUIRE A UNIQUE CODE. THIS CAN CONSIST *OF 64* OPTIONS, BUILDING TO 1000 IN THE SECOND QUARTER AND 1 MILLION IN THE THIRD QUARTER.

C. ALL TRARNSPONDERS SHOULD BEACON REGULARLY AT A BEACON RATE THAT IS PROGRAMMABLE FROM THREE TIMES A SECOND TO ONCE AN HOUR.

D. ALL TRANSPONDERS SHOULD BE ABLE TO TRANSMIT IMMEDIATELY WHEN A SELECTED PIN ON THE MICROPROCESSOR GOES HIGH.

E. ALL TRANSPONDERS SHOULD TRANSMIT THEIR DATA THREE TIMES WITH A 40MS SPACE BETWEEN EACH.

F. ALL TRANSPONDERS SHOULD TRANSMIT EACH BIT IN A 200uS TIME SLOT. AN "0" IS REPRESENTED BY A 40 MICROSECOND PULSE (THE FIRST *25%* OF THE TIME SLOT) AND A "1", BY THREE CONSECUTIVE 40 MICROSECOND PULSES (THE FIRST *75%* OF THE TIME SLOT). START BITS CAN BE MORE THAN 3 CONSECUTIVE 40 MICROSECOND PULSES AND STOP BITS CAN BE ONE OR TWO TIME SLOTS WITHOUT A TRANSMISSION.

G. ALL TRANSPONDERS NEED BY Q3'2003 TO BE ABLE TO TRANSMIT DATA REPRESENTING TEMPERATURE AND BATTERY CONDITION (FUNCTIONS PROVIDED BY THE MICROPROCESSOR).

FIG. 2-06A

RADIODATA APPLICATION DESCRIPTIONS TRANSPONDER FIRMWARE PROPOSAL (continued)

2. SPECIFIC APPLICATION FIRMWARE

A. THE FIRST TRANSPONDER IS A BEACON TAG WITH STANDARD GENERIC FIRMWARE, THAT WILL BE USED FOR SIMPLE DEMONSTRATIONS AND FOR LOCATION ONLY APPLICATIONS.

B. THE SECOND TRANSPONDER WILL INCLUDE THE ABILITY TO APPEND STATUS BITS TO THE CODE. THESE STATUS BITS WILL REPORT THE HIGH OR LOW STATUS OF THREE TO FIVE MICROPROCESSOR I/Os.

C. THE THIRD TRANSPONDER NEEDS TO BE ABLE TO APPEND TO THE TRANSPONDER'S CODE A SIMPLE THREE BIT CODED INPUT TO A PIN ON THE MICROPROCESSOR (A POLLING SIGNAL).

D. THE FOURTH TRANSPONDER NEEDS TO BE ABLE TO SWITCH ON POWER TO EXTERNAL SENSORS AND TAKE ANALOG DATA INPUT TO THREE I/O PINS. IT NEEDS TO TAKE THREE CONSECUTIVE SAMPLES, AVERAGE THE CLOSEST TWO AND STORE THAT DATA. IT NEEDS TO DO THIS EVERY 2 TO 5 SECONDS, STORING THE AVERAGE OF THE THREE LAST READINGS. THEN IT NEEDS TO COMPUTE THE DIFFERENCE BETWEEN THE LAST TWO AVERAGES AND COMPARE THE RATE OF CHANGE WITH THREE POSITIVE/NEGATIVE RATE OF CHANGE LIMITS AND MODIFY ITS BEACON RATE DEPENDING ON ANY VIOLATION OF THESE LIMITS. FURTHER IT NEEDS TO COMPARE THIS AVERAGE OF AVERAGES WITH THREE HIGH/LOW PAIRS OF LIMITS AND MODIFY ITS BEACON RATE DEPENDING ON ANY VIOLATION OF THESE LIMITS. THE LATEST AVERAGE OF AVERAGES DATA IS ALWAYS TRANSMITTED AT THE BEACON RATE OR THE SELECTED VIOLATION OVERRIDE RATE. THE TRANSPONDER HAS THREE MODES OF OPERATION 1. SLEEP MODE; 2. WAKE-UP MODE, POWER SENSORS, TAKE READINGS, PROCESS THEM AND COMPARE WITH LIMITS, RETURNING TO SLEEP MODE IF NO ANOMALY IS FOUND; 3. TRANSMIT MODE.

FIG. 2-06B

RADIODATA APPLICATION DESCRIPTIONS TRANSPONDER FIRMWARE PROPOSAL (continued)

E. A FIFTH TRANSPONDER NEEDS TO CONTROL AND TAKE DIGITAL DATA INPUT AND TRANSMIT IT AT A PRESCRIBED BEACON RATE OR IMMEDIATELY WHEN POLLED, APPENDING ONE BIT TO INDICATE WHETHER IT IS TRANSMITTING ON A NORMAL BEACON SCHEDULE OR BECAUSE IT WAS POLLED.

SCHEDULE

A. 1 .a TWO GROUP CODES
1.b SIXTY-FOUR UNIQUE CODES
1.c BEACON RATE TWO SECONDS
1.d POLLING OPTION (UNCODED)
1.e TRANSMIT THREE TIMES SPACED 40mS
1.f STANDARD 40uS PULSE WIDTH & 200uS TIME SLOT -10000 “0”, 11110 “1”
1.g OMIT
2. OMIT ALL

B. 1.a TWO GROUP CODES
1.b SIXTY-FOUR UNIQUE CODES
1.c BEACON RATE TWO SECONDS
1.d POLLING OPTION (UNCODED)
1.e TRANSMIT THREE TIMES SPACED 40mS
1.f STANDARD 40U5 PULSE WIDTH & 200U5 TIME SLOT -10000 “0”, 11110 “1”
1.G OMIT
2.a
2.b

FIG. 2-06C

TRANSPONDER TRANSMISSION PERIODICITY DECISION TABLE

Example of a Sensor Sampling Plan (Truck Wheel Monitoring)

Step 1	Wake up every 2 seconds, take 3 samples, average closest two readings, store in A
Step 2	Wake up every 2 seconds, move store A to store B, take 3 samples, average closest two readings, store in A
Step 3	Wake up every 2 seconds, move store B to store C, move store A to store B, take 3 samples, average closest two readings, store in A
Step 4	Compare value of data stored in A with limit table and react accordingly
Step 5	Average the averages stored in A, B and C and store in D
Step 6	Compare value of data stored in.A with data stored in B, check change with Rate of Change Table and react accordingly
Step 7	plus Continue to repeat steps 3 through 6 indefinitely

Example of a Limit Table (Truck Wheel Monitoring)

Normal	Convert	Transmit	Repeat	
plus/minus	every	every	eaTx	
0 to 12.5%	300 secs	300 secs	3 times	
12.5 to 25%	90 secs	90 secs	6 times	Warn
25 to 50%	30 secs 3	0 secs	25 times	Alert
over 50%	10 secs	10 secs	50 times	Alarm

Example of Rate of Change Table (Truck Wheel Monitoring)

Change	Convert	Transmit	Repeat	Action
greater than	everyev	ery	ea Tx	
0%	450 secs	900 secs	3 times	
6.25%	150 secs	300 secs	6 times	Warn
12.50%	90 secs	90 secs	12 times	Alert 1
25%	30 secs	30 secs	25 times	Alert 2

FIG. 2-07A

TRANSPONDER TRANSMISSION PERIODICITY TABLE II

Example of a Sensor Sampling Plan (Home/Big. Monitoring)

Step 1	Wake up every 2 seconds, take 3 samples of all sensed parameters, average closest two readings, store in A
Step 2	Wake up every 2 seconds, move store A to store B, take 3 samples of all sensed parameters, average closest two readings, store
Step 3	Wake up every 2 seconds, move store B to store C, move store A to store B, take 3 samples, average closest two readings, store
Step 4	Compare value of data stored in A with limit tables for each sensed parameter and react accordingly
Step 5	Average the averages stored in A, B and C and store in D for each sensed parameter
Step 6	Compare value of data stored in A with data stored in B, check change with Rate of Change Tables for each and react according
Step 7	Compare changes in several selected parameters to stored relationships to determine any relationship anomalies and react accordingly
Step 8 plus	Continue to repeat steps 3 through 6 indefinitely

Example of a Limit Table (Home/Big. Monitoring)

Normal plus/minus	Convert every	Transmit every	Repeat eaTx	
0 to 125%	30 mins	60 mins	3 times	
12.5 to 25%	90 secs	90 secs	6 times	Warn
25 to 50%	30 secs	30 secs	25 times	Alert
over 50%	10 secs	10 secs	50 times	Alarm

FIG. 2-07B

TRANSPONDER TRANSMISSION PERIODICITY TABLE II (CONT.)

Example of Rate of Change Table (Home/Big. Monitoring)

Change greater than	Convert every	Transmit every	Repeat ea Tx	Action
0%	30 mins	60 mins	3 times	
6.25%	150 secs	300 secs	6 times	Warn
12.50%	90 secs	90 secs	12 times	Alert 1
25%	30 secs	30 secs	25 times	Alert 2
50%	10 secs	10 secs	50 times	Alarm

FIG. 2-08

Example of Parameter Relationship Table (Home/Big. Monitoring)

Change relationship	Convert/Transmit/Repeat/Action every/every/ea Tx
A less than 5% greater or less than B or C, or B greater or less than C	30 mins /60 mins/3 times
A greater than 5% greater or less than B or C, or B greater or less than C	150 secs/300 secs/6 times/Warn
A greater than 15% greater or less than B or C, or B greater or less than C	90 secs/90 secs/12 times/Alert 1
A greater than 15% greater or less than B or C, or B greater or less than C*	30 secs/30 secs/25 times/Alert 2
A greater than 25% greater or less than B or C, or B greater or less than C	10 secs/10 secs/50 times/Alarm

* When either of A, B or C has a limit failure of over 10% and a Rate of Change of over 5%

Note: Each sensed parameter and appropriate parameter relationship is analyzed, and the response is determined for each parameter or parameter relationship. However the data transmission periodicity and repetition is determined by the most critical parameter or parameter relationship (the transmission format is always the same).

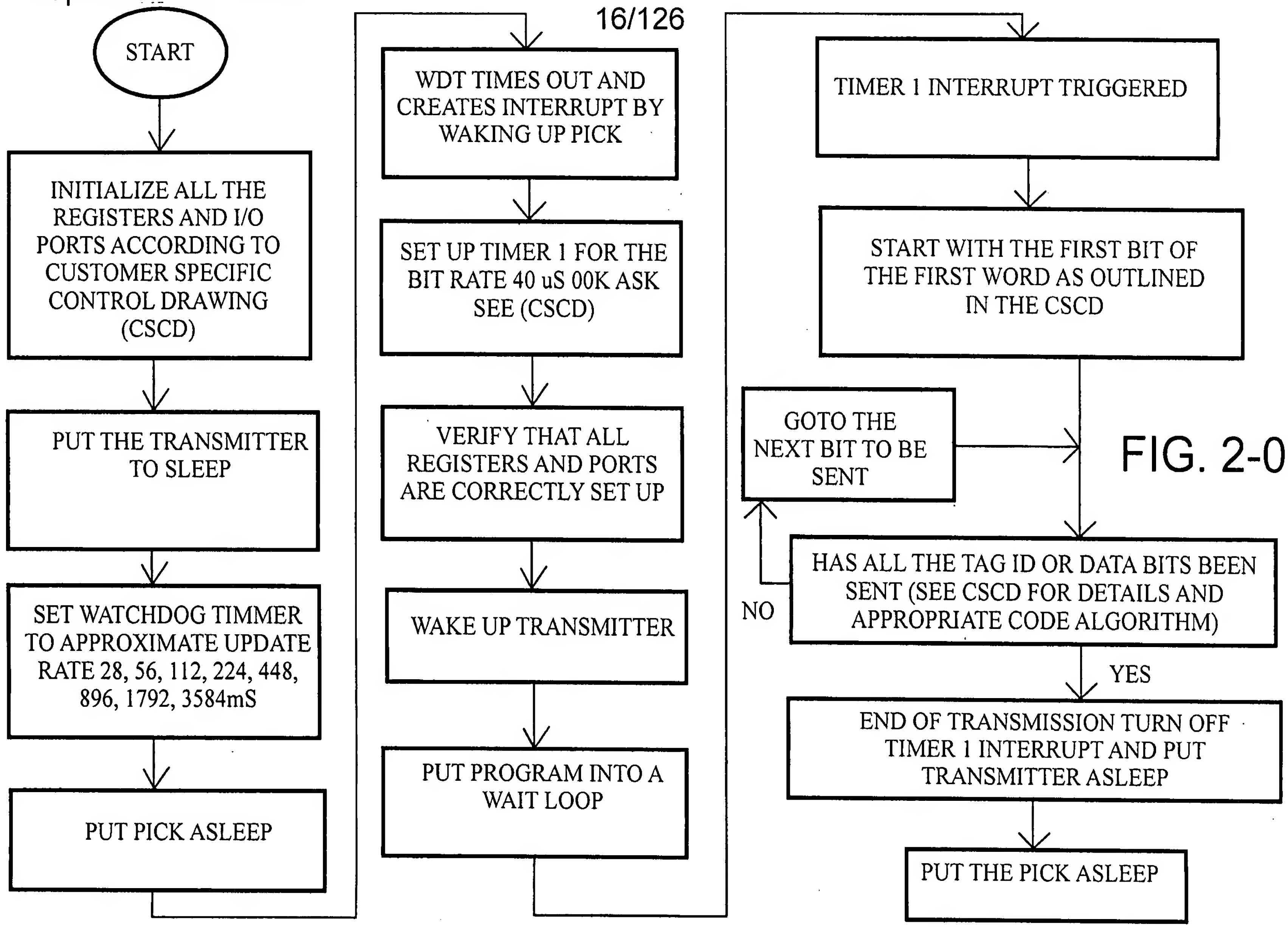

START
INITIALIZE ALL THE REGISTERS AND I/O PORTS ACCORDING TO CUSTOMER SPECIFIC CONTROL DRAWING (CSCD)
PUT THE TRANSMITTER TO SLEEP
SET WATCHDOG TIMMER TO APPROXIMATE UPDATE RATE 28, 56, 112, 224, 448, 896, 1792, 3584mS
PUT PICK ASLEEP
WDT TIMES OUT AND CREATES INTERRUPT BY WAKING UP PICK
SET UP TIMER 1 FOR THE BIT RATE 40 uS 00K ASK SEE (CSCD)
VERIFY THAT ALL REGISTERS AND PORTS ARE CORRECTLY SET UP
WAKE UP TRANSMITTER
PUT PROGRAM INTO A WAIT LOOP
TIMER 1 INTERRUPT TRIGGERED
START WITH THE FIRST BIT OF THE FIRST WORD AS OUTLINED IN THE CSCD
GOTO THE NEXT BIT TO BE SENT
HAS ALL THE TAG ID OR DATA BITS BEEN SENT (SEE CSCD FOR DETAILS AND APPROPRIATE CODE ALGORITHM)
NO
YES
END OF TRANSMISSION TURN OFF TIMER 1 INTERRUPT AND PUT TRANSMITTER ASLEEP
PUT THE PICK ASLEEP

FIG. 2-09

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-01-01	433.92MHz	Optional	None	Basic Demo
03-000139-01-02	433.92MHz	Optional	None	SSI WAMS
03-000139-01-03	433.92MHz	Optional	None	S&G Code
03-000139-01-04	433.92MHz	Optional	None	Medical 1
03-000139-02-05	433.92MHz	Optional	None	Home Sec. 1
03-000139-02-01	433.92MHz	OOK	None	Basic Demo
03-000139-02-02	433.92MHz	OOK	None	SSI WAMS
03-000139-02-03	433.92MHz	OOK	None	S&G Code
03-000139-02-04	433.92MHz	OOK	None	Medical 1
03-000139-02-05	433.92MHz	OOK	None	Home Sec. 1
03-000139-03-01	433.92MHz	ASK	None	Basic Demo
03-000139-03-02	433.92MHz	ASK	None	SSI WAMS
03-000139-03-03	433.92MHz	ASK	None	S&G Code
03-000139-03-04	433.92MHz	ASK	None	Medical 1
03-000139-03-05	433.92MHz	ASK	None	Home Sec. 1
03-000139-11-01	303.825MHz	Optional	None	Basic Demo
03-000139-11-02	303.825MHz	Optional	None	SSI WAMS
03-000139-11-03	303.825MHz	Optional	None	S&G Code
03-000139-11-04	303.825MHz	Optional	None	Medical 1
03-000139-11-05	303.825MHz	Optional	None	Home Sec. 1
03-000139-12-01	303.825MHz	OOK	None	Basic Demo
03-000139-12-02	303.825MHz	OOK	None	SSI WAMS
03-000139-12-03	303.825MHz	OOK	None	S&G Code
03-000139-12-04	303.825MHz	OOK	None	Medical 1
03-000139-12-05	303.825MHz	OOK	None	Home Sec. 1
03-000139-13-01	303.825MHz	ASK	None	Basic Demo
03-000139-13-02	303.825MHz	ASK	None	SSI WAMS
03-000139-13-03	303.825MHz	ASK	None	S&G Code
03-000139-13-04	303.825MHz	ASK	None	Medical 1
03-000139-13-05	303.825MHz	ASK	None	Home Sec. 1

FIG. 2-10A

Replacement Sheet

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-21-01	418MHz	Optional	None	Basic Demo
03-000139-21-02	418MHz	Optional	None	SSI WAMS
03-000139-21-03	418MHz	Optional	None	S&G Code
03-000139-21-04	418MHz	Optional	None	Medical 1
03-000139-22-05	418MHz	Optional	None	Home Sec. 1
03-000139-22-01	418MHz	OOK	None	Basic Demo
03-000139-22-02	418MHz	OOK	None	SSI WAMS
03-000139-22-03	418MHz	OOK	None	S&G Code
03-000139-22-04	418MHz	OOK	None	Medical 1
03-000139-22-05	418MHz	OOK	None	Home Sec. 1
03-000139-23-01	418MHz	ASK	None	Basic Demo
03-000139-23-02	418MHz	ASK	None	SSI WAMS
03-000139-23-03	418MHz	ASK	None	S&G Code
03-000139-23-04	418MHz	ASK	None	Medical 1
03-000139-23-05	418MHz	ASK	None	Home Sec. 1
03-000139-31-01	916.5MHz	Optional	None	Basic Demo
03-000139-31-02	916.5MHz	Optional	None	SSI WAMS
03-000139-31-03	916.5MHz	Optional	None	S&G Code
03-000139-31-04	916.5MHz	Optional	None	Medical 1
03-000139-31-05	916.5MHz	Optional	None	Home Sec. 1
03-000139-32-01	916.5MHz	OOK	None	Basic Demo
03-000139-32-02	916.5MHz	OOK	None	SSI WAMS
03-000139-32-03	916.5MHz	OOK	None	S&G Code
03-000139-32-04	916.5MHz	OOK	None	Medical 1
03-000139-32-05	916.5MHz	OOK	None	Home Sec. 1
03-000139-33-01	916.5MHz	ASK	None	Basic Demo
03-000139-33-02	916.5MHz	ASK	None	SSI WAMS
03-000139-33-03	916.5MHz	ASK	None	S&G Code
03-000139-33-04	916.5MHz	ASK	None	Medical 1
03-000139-33-05	916.5MHz	ASK	None	Home Sec. 1

FIG. 2-10B

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-06-01	433.92MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-06-02	433.92MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-06-03	433.92MHz	Optional	13.56MHz Unc	S&G Code
03-000139-06-04	433.92MHz	Optional	13.56MHz Unc	Medical 1
03-000139-06-05	433.92MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-07-01	433.92MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-07-02	433.92MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-07-03	433.92MHz	OOK	13.56MHz Unc	S&G Code
03-000139-07-04	433.92MHz	OOK	13.56MHz Unc	Medical 1
03-000139-07-05	433.92MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-08-01	433.92MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-08-02	433.92MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-08-03	433.92MHz	ASK	13.56MHz Unc	S&G Code
03-000139-08-04	433.92MHz	ASK	13.56MHz Unc	Medical 1
03-000139-08-05	433.92MHz	ASK	13.56MHz Unc	Home Sec. 1
03-000139-16-01	303.825MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-16-02	303.825MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-16-03	303.825MHz	Optional	13.56MHz Unc	S&G Code
03-000139-16-04	303.825MHz	Optional	13.56MHz Unc	Medical 1
03-000139-16-05	303.825MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-17-01	303.825MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-17-02	303.825MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-17-03	303.825MHz	OOK	13.56MHz Unc	S&G Code
03-000139-17-04	303.825MHz	OOK	13.56MHz Unc	Medical 1
03-000139-17-05	303.825MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-18-01	303.825MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-18-02	303.825MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-18-03	303.825MHz	ASK	13.56MHz Unc	S&G Code
03-000139-18-04	303.825MHz	ASK	13.56MHz Unc	Medical 1
03-000139-18-05	303.825MHz	ASK	13.56MHz Unc	Home Sec. 1

FIG. 2-10C

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-26-01	418MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-26-02	418MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-26-03	418MHz	Optional	13.56MHz Unc	S&G Code
03-000139-26-04	418MHz	Optional	13.56MHz Unc	Medical 1
03-000139-26-05	418MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-27-01	418MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-27-02	418MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-27-03	418MHz	OOK	13.56MHz Unc	S&G Code
03-000139-27-04	418MHz	OOK	13.56MHz Unc	Medical 1
03-000139-27-05	418MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-28-01	418MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-28-02	418MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-28-03	418MHz	ASK	13.56MHz Unc	S&G Code
03-000139-28-04	418MHz	ASK	13.56MHz Unc	Medical 1
03-000139-28-05	418MHz	ASK	13.56MHz Unc	Home Sec. 1
03-000139-36-01	916.5MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-36-02	916.5MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-36-03	916.5MHz	Optional	13.56MHz Unc	S&G Code
03-000139-36-04	916.5MHz	Optional	13.56MHz Unc	Medical 1
03-000139-36-05	916.5MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-37-06	916.5MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-37-07	916.5MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-37-08	916.5MHz	OOK	13.56MHz Unc	S&G Code
03-000139-37-09	916.5MHz	OOK	13.56MHz Unc	Medical 1
03-000139-37-10	916.5MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-38-01	916.5MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-38-02	916.5MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-38-03	916.5MHz	ASK	13.56MHz Unc	S&G Code
03-000139-38-04	916.5MHz	ASK	13.56MHz Unc	Medical 1
03-000139-38-05	916.5MHz	ASK	13.56MHz Unc	Home Sec. 1

FIG. 2-10D

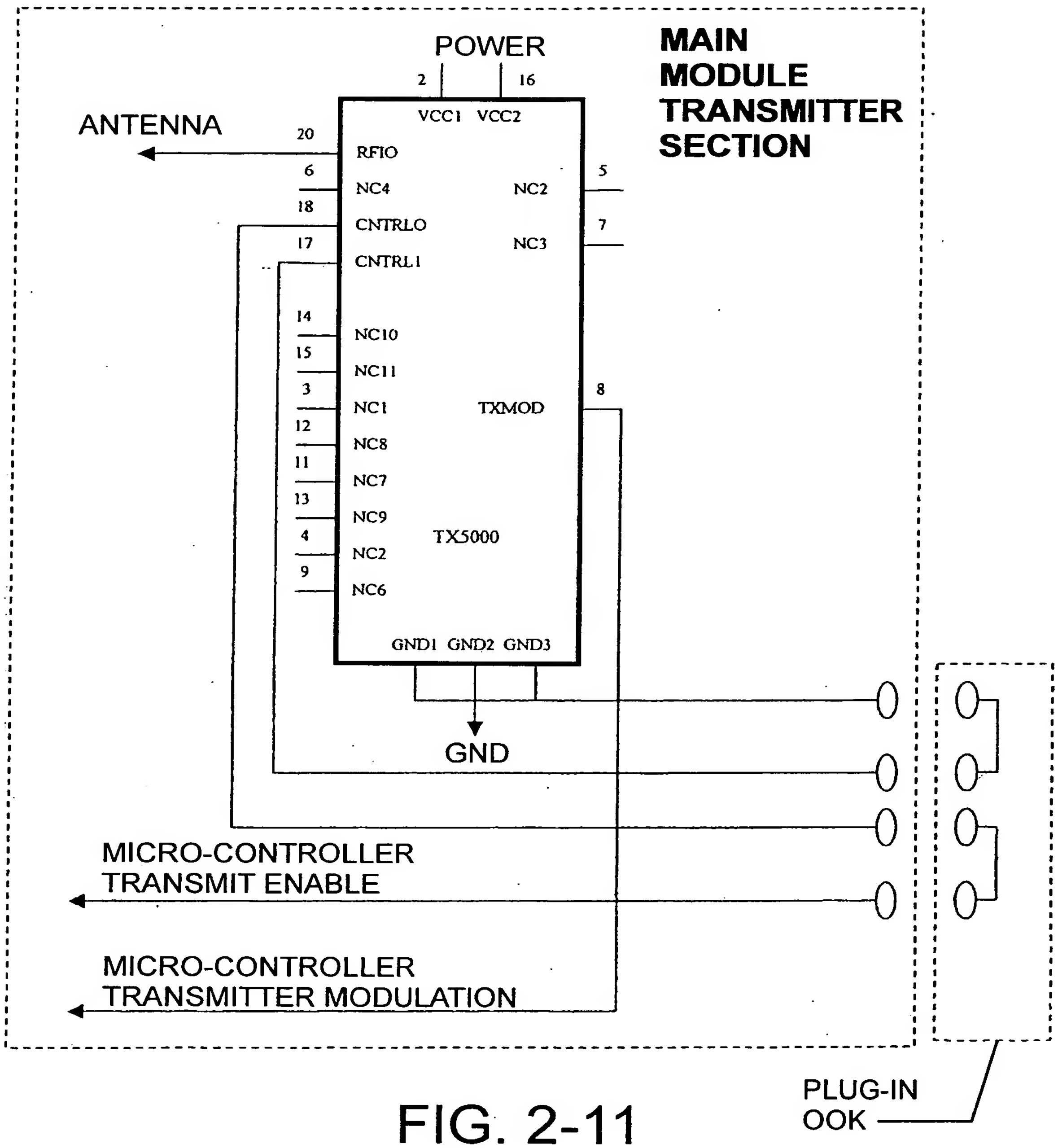

MAIN
MODULE
TRANSMITTER
SECTION
POWER
2
16
VCC1 VCC2
ANTENNA
20
RFIO
6
NC4
NC2
5
18
CNTRLO
7
17
CNTRL1
NC3
14
NC10
15
NC11
3
NC1
TXMOD
8
12
NC8
11
NC7
13
NC9
4
NC2
TX5000
9
NC6
GND1 GND2 GND3
GND
MICRO-CONTROLLER
TRANSMIT ENABLE
MICRO-CONTROLLER
TRANSMITTER MODULATION
PLUG-IN
OOK

FIG. 2-11

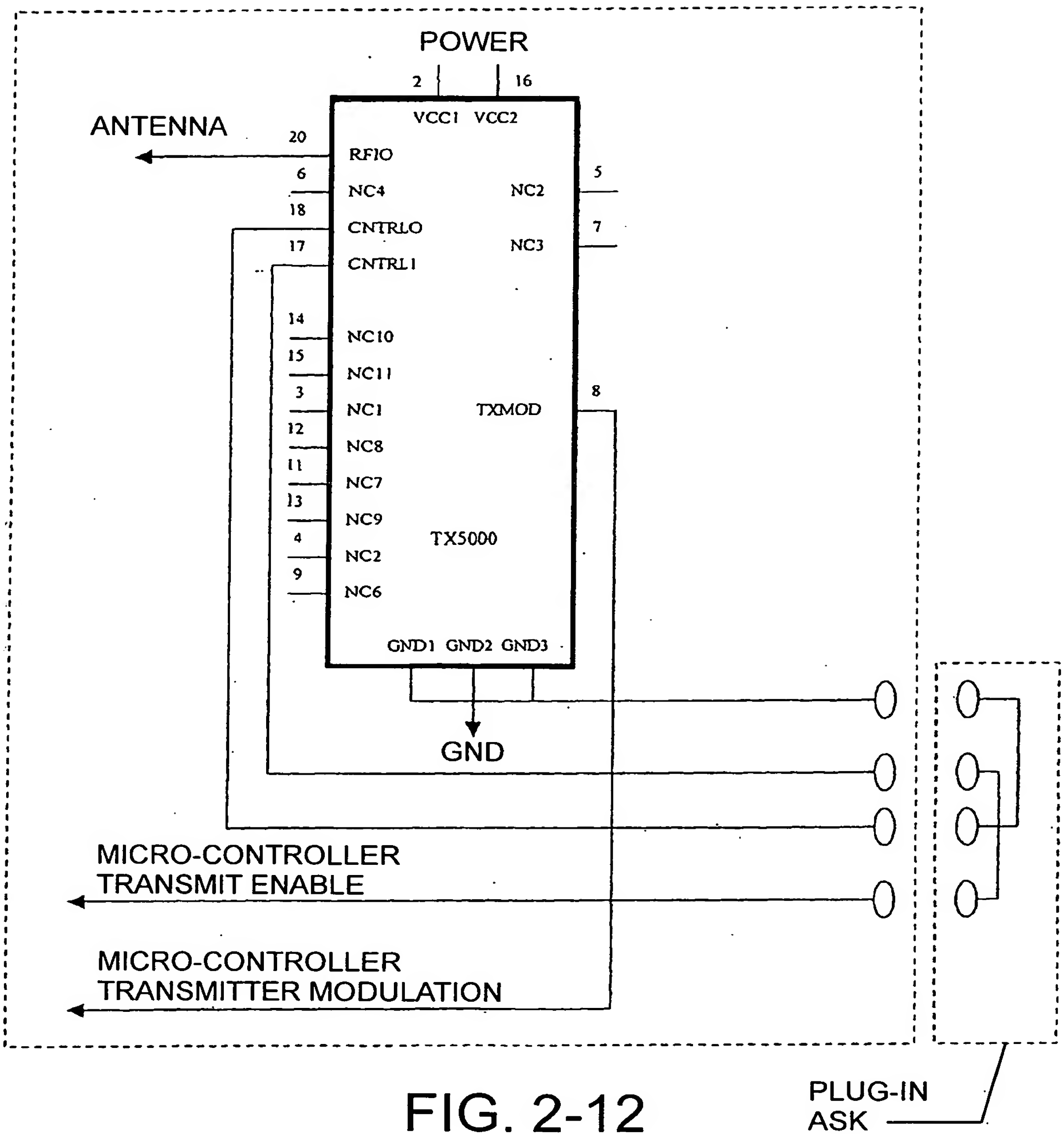

POWER
2
16
VCC1
VCC2
ANTENNA
20
RFIO
6
NC4
18
CNTRLO
17
CNTRL1
5
NC2
7
NC3
14
NC10
15
NC11
3
NC1
12
NC8
11
NC7
13
NC9
4
NC2
9
NC6
8
TXMOD
TX5000
GND1
GND2
GND3
GND
MICRO-CONTROLLER
TRANSMIT ENABLE
MICRO-CONTROLLER
TRANSMITTER MODULATION
PLUG-IN
ASK

FIG. 2-12

Replacement Sheet

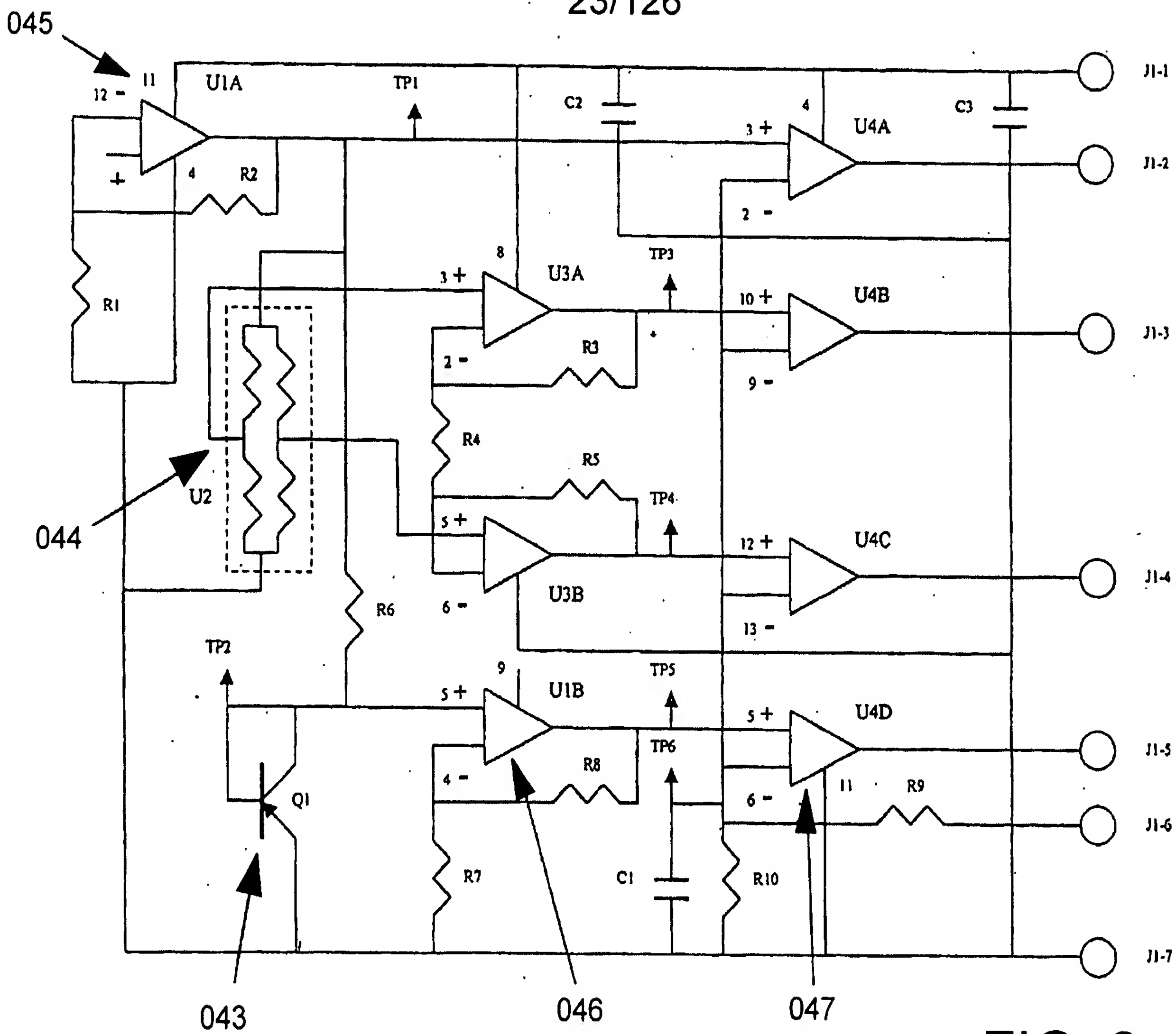
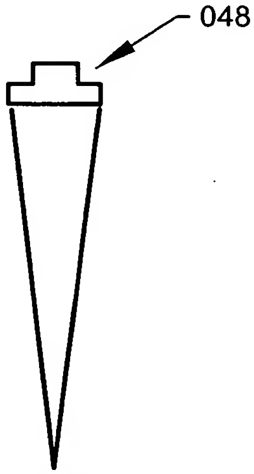
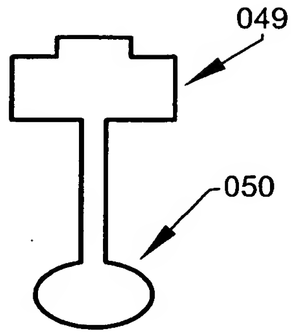


FIG. 2-13



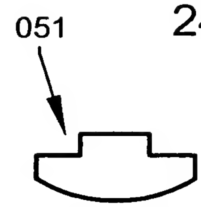
GROUND MOISTURE

FIG. 14A



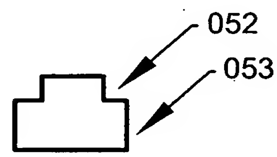
FLOATING POOL SENSOR

FIG. 14B



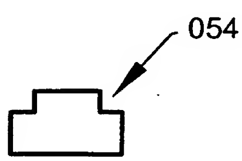
MOTION/ACOUSTIC SENSOR

FIG. 14C



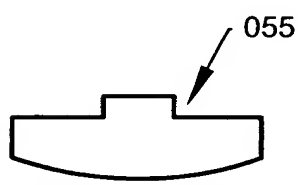
ITEM/PERSONNEL TRACKER

FIG. 14D



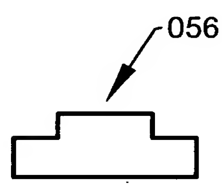
GATE/DOOR OPEN SENSOR

FIG. 14E



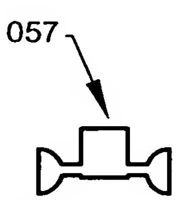
TEMP/SMOKE/FIRE SENSOR

FIG. 14F



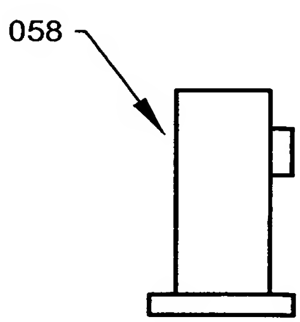
RADIOACTIVE SENSOR

FIG. 14G



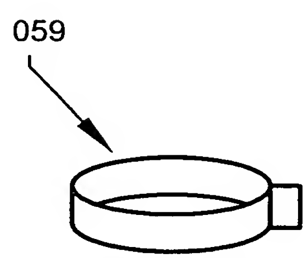
WIND VELOCITY SENSOR

FIG. 14H



RAIN GAUGE

FIG. 14I



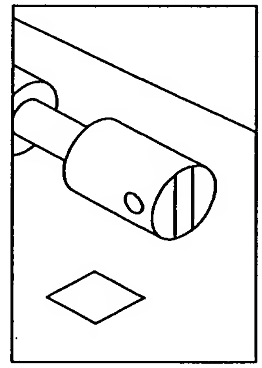
BLOOD PRESSURE MONITOR

FIG. 14J

DASCORE INCORPORATED

"DASCORE Inc...Technology for Water Quality Monitoring"

Six-CENSE
6-in-l Water Quality Sensor



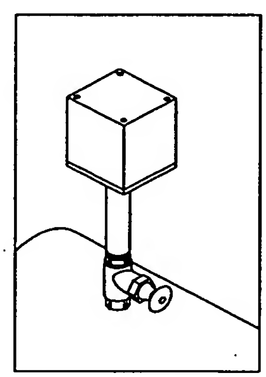
PROBE HEAD & CHIP

The **Six-CENSE tm** is a 6-in-1 multiparameter in-line sensor that can measure Chlorine (free chlorine), Chloramines (combined chlorine) or Dissolved Oxygen, pH, Conductivity, Oxidation-Reduction Potential, and Temperature. This electrochemical technology sits on a robust ceramic chip. **Six-CENSE** is the only multi-parameter sensor designed for direct insertion into pressurized water mains from 2 inches to 36 inches in diameter. This capability makes the Six-CENSE tm ideally suited to fulfill the requirements of water utilities to monitor the water quality throughout their distribution system. The unit is easy to install, simple to calibrate, and is designed for durability and minimum operator maintenance.

Six-CENSE tm
simultaneously measures: Chlorine - No reagents required, Monochloramine or Dissolved Oxygen, pH , Temperature , Conductivity, and ORP/REDOX

FEATURES:

- All data time-date stamped for analysis and liability protection.
- Data available in 4-20 mA output or LONWORKS® network variable format.
- Direct and reagent-free measurement of Chlorine.
- Capability for measuring Combined Chlorine for plants using chloramination.
- Membrane-free measurement of Dissolved Oxygen.
- Sensor chip field replaceable with typical six-month service
- life.
- Units available in NEMA 4X/1P66 enclosures.
- Installs in 1.5" or 2" saddle valve, gate valve, or ball valve.



Six-CENSE tm INSERTION INTO PIPE

71 Tallwood Road 866-321-3804 - Toll free
Jacksonvile FL 32250 904- 249-9283 - Facsimile
www.dascore.com

FIG. 2-15a

DASCORE INCORPORATED

"DASCORE Inc...Technology for Water Quality Monitoring"

Applications:

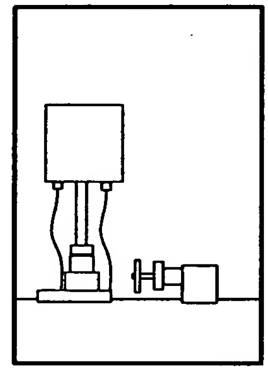
Chlorine
Range 0 - 5 mg/L
Sensitivity <0.01 mg/L
Accuracy ±0.04 mg/L or 5% of reading, whichever is greater

Chioramines
Range 0-20 mg/L
Sensitivity <0.05 mg/L or 5% of reading, whichever is greater
Repeatability +/- 0.1 mg/L or 5% of reading, whichever is greater
Accuracy +/- 0.1 mg/L or 5% of reading, whichever is greater

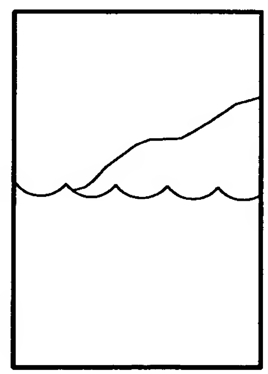
(Customer specifies either chioramines or dissolved oxygen.)

Dissolved Oxygen
Range 0- 20 mg/L or 0 - 200% saturation
Sensitivity <0.1 mg/L
Accuracy ±0.1 mg/L or 5% of reading, whichever is greater

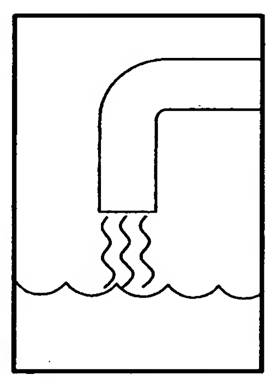
Temperature
Range 0 - +50 DEGREES C
Sensitivity <0.1%
Repeatability ±0.1%
Accuracy ±0.25 DEGREES C or ±0.1% of reading, whichever is greater



FINISHED WATER



SOURCE WATER



WASTEWATER FINAL EFFLUENT

FIG. 2-15b

DASCORE INCORPORATED

Applications (cont.):

Conductivity
Range 0.1 - 10.0 mS/cm
Sensitivity <10uS/cm
Repeatability ±10uS/cm or ±1% of reading, whichever is greater

pH
Range 2 - 12
Sensitivity <0.1 pH
Repeatability ±0.1 pH
Accuracy ±0.5 pH

Redox/ORP Range -1.4 to 1.4 V
Sensitivity <1% of range
Repeatability ±1% of range
Accuracy ±1% of range

Reference Electrode
Silver/Silver Chloride type
Drift <5mV in six months
Operational life: Typical six-month continuous operation

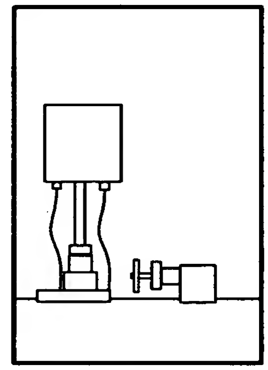
Probe Head
Diameter 37 mm (1.48")
Quick release bayonet fitting of sensor chip
Pressure tested to 350 psi, 230 psi continuous rating
Direct insertion into pipe, through gate valve or metering box

Electronics
Available with 4-20 mA or LONWORKS® output. Please contact your Dascore Inc. sales representative.

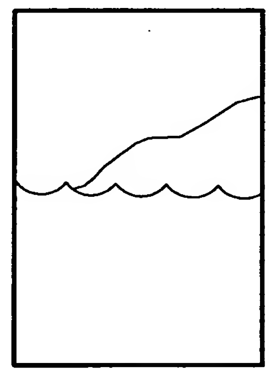
Specifications subject to change without notice.

Our goal is to provide the most cost-effective water quality monitoring technology worldwide.

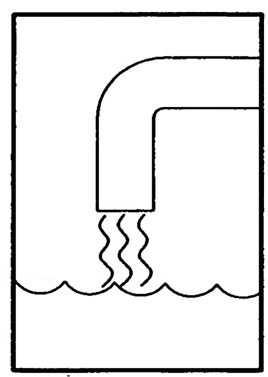
71 Tallwood Road 866-321-3804 - Toll free
Jacksonvile FL 32250 904- 249-9283 - Facsimile
www.dascore.com



FINISHED WATER



SOURCE WATER



WASTEWATER FINAL EFFLUENT

FIG. 2-15c

Replacement Sheet

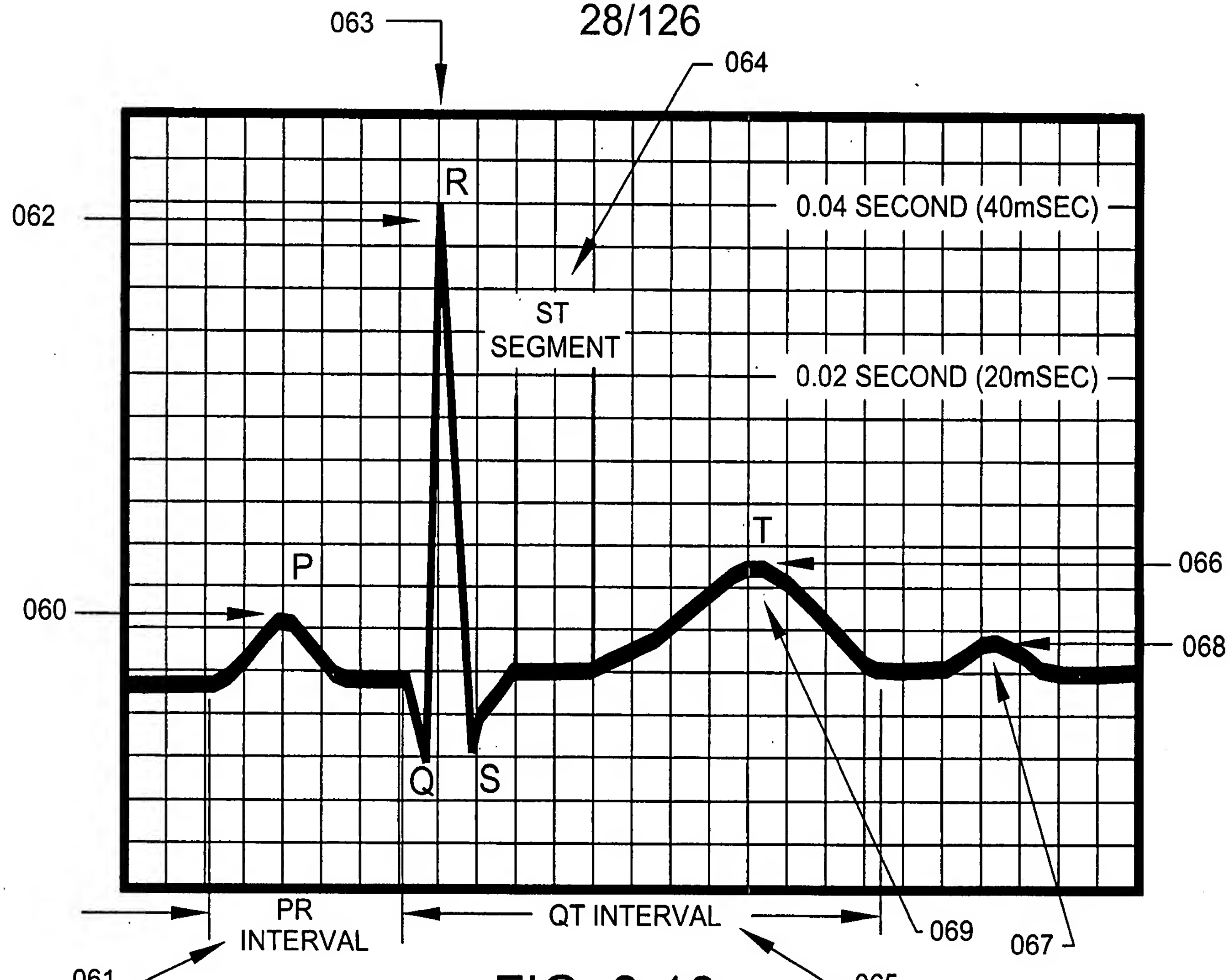


FIG. 2-16

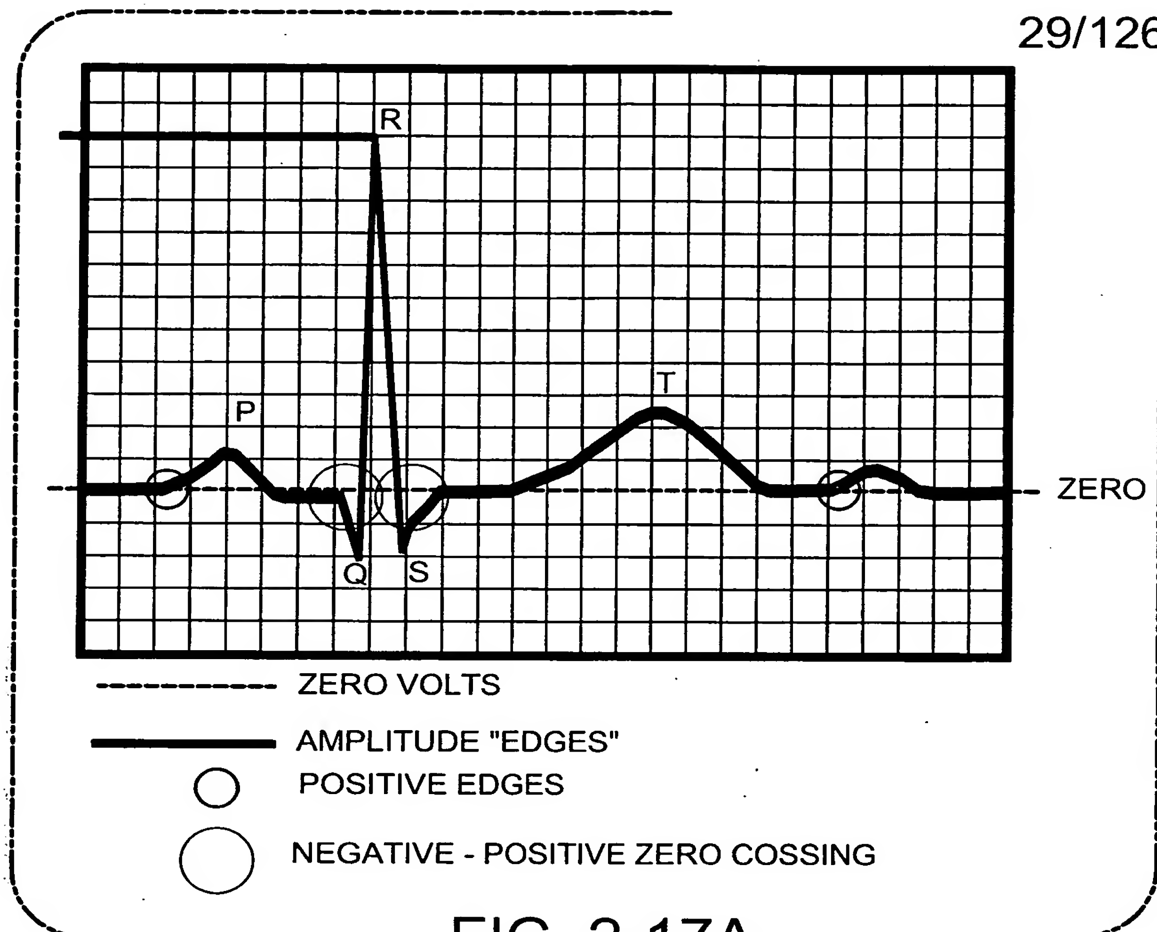


FIG. 2-17A

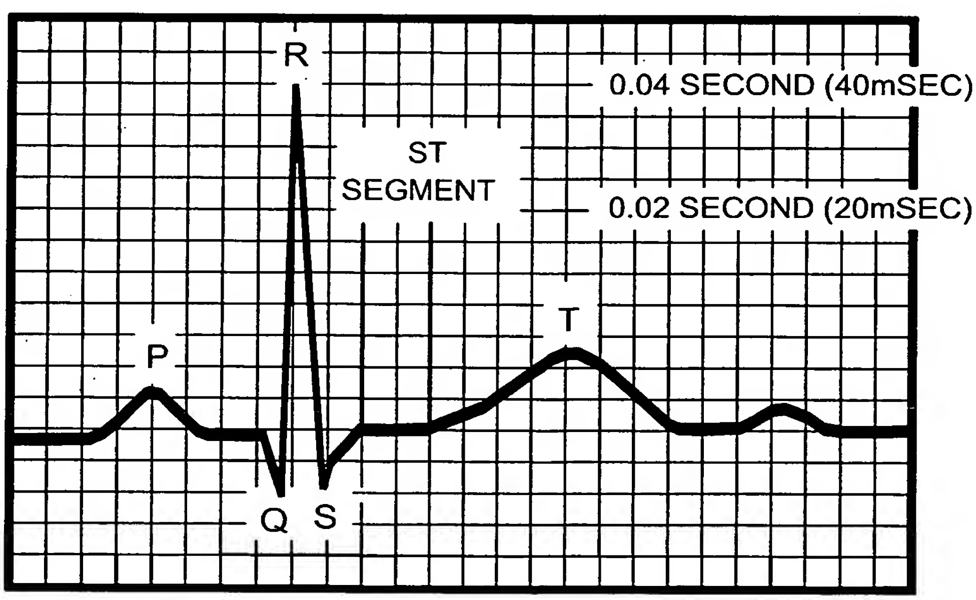


FIG. 2-17B

Signal Processing Group Inc. 561 E. Elliot Road, Chandler, Arizona, 85225, Tel: (480) 892 1399

Specifications for the LFAFE, the low frequency analog front end. SPGO4O2

General Description: The LFAFE is a mixed signal CMOS monolithic device that acts as an analog front end or interface to a set of sensors. The device provides a programmable current to energize these sensors and measures the response from the sensors. A clock oscillator is provided on chip for timing purposes. A voltage reference is implemented on chip for use in A/D conversion of the sensed outputs. A communication interface using a three-wire channel is used to communicate with the device. Communications consist of programming a channel identification, sensor drive current and settling time delay for the AID conversion. Control logic for the various operations resides on chip. External components consist of sensors and miscellaneous resistors and capacitors for timing. The device is packaged in a 16 pin plastic package or can be delivered as a die for direct chip on board mounting.

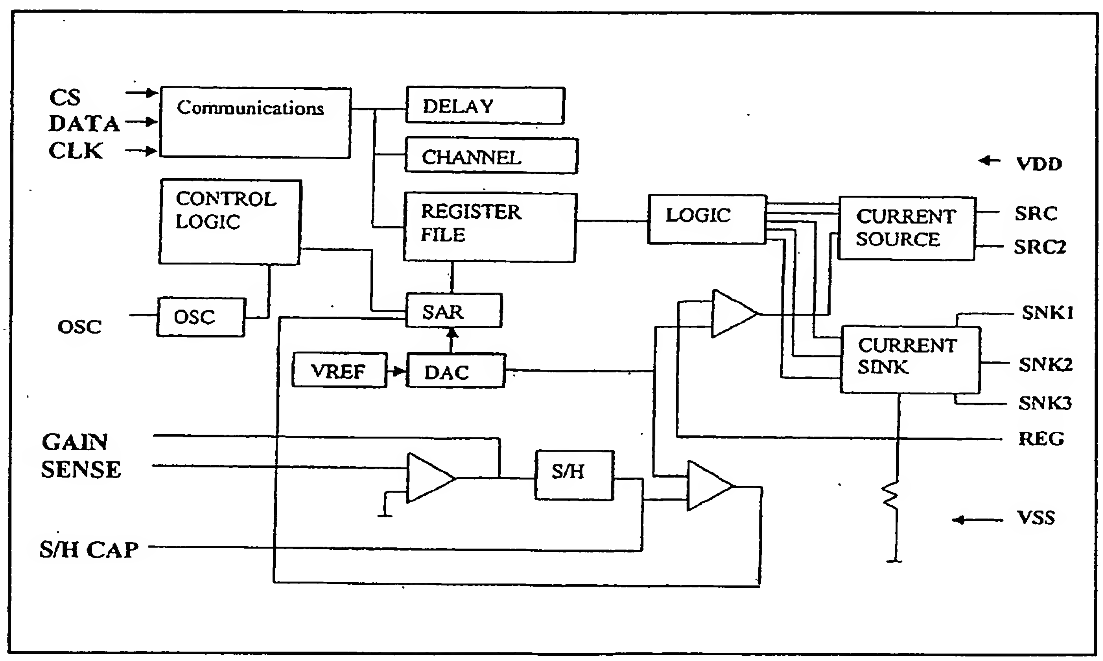


FIG. 2-18a

LFAFE PACKAGE PINS

Pin	Name	Description
1	SDA	Bi-directional pin. Serial data.
2	SCL	Input Pin. Serial Clock
3	ECS	Output pin. EEPROM Select.
4	SRC I	Output pin. SENSOR Drive (Current Drive).
5	SRC2	Output pin. SENSOR Drive (Current Drive)
6	REG	Output pin. Establish level of current drive for SRC1, SRC2.
7	SNK3	Output pin. Current sink 3.
8	VSS	Ground or common.
9	SNK2	Output pin. Current sink 2.
10	SNK1	Output pin. Current sink 1.
11	GAIN	Output pin. Gain set for internal amplifier for sensing the response current.
12	SHCAP	Input pin. External capacitor for sample and hold function
13	SENSE	Input pin. Sense the output currents from photo-

LFAFE OPERATION

The LFAFE typically needs an EEPROM and a host micro-controller for its operation. The host controls the LFAFE operation and communicates with the EEPROM via read/write commands transmitted over the serial interface. Only two signals are required to operate the serial interface, SDA and SCL. In a custom system on a chip, application the customer may choose to implement all these macro blocks on the same chip, thereby evolving a new machine. *Since the LFAFE is a fully tested functional block as well as the EEPROMs and uC this is a perfectly viable choice and a low risk implementation*.

FIG. 2-18b1

LFAFE OPERATION(cont.)

The LFAFE typically needs an EEPROM and a host micro-controller for its operation. The host controls the LFAFE operation and communicates with the EEPROM via read/write commands transmitted over the serial interface. Only two signals are required to operate the serial interface, SDA and SCL. In a custom system on a chip, application the customer may choose to implement all these macro blocks on the same chip, thereby evolving a new machine. *Since the LFAFE is a fully tested functional block as well as the EEPROMs and uC this is a perfectly viable choice and a low risk implementation.*

Data is clocked in to the LFAFE on the positive edge of SCL. Normally SDA only changes when SCL is low. There are two exceptions: the START and STOP conditions.

START Condition: Positive transition on SDA when SCL is high. STOP Condition: Negative transition on SDA when SCL is high.

The first data bit following the start condition determines whether the LFAFE is to be selected or the EEPROM. The complement of this bit is output on ECS which is connected to the CS pin on the EEPROM. When the EEPROM is selected the LFAFE ignores any further start conditions or data and disables itself until a stop condition is selected. A stop condition also causes the EEPROM chip select signal to be pulsed low.

FIG. 2-18b2

Signal Processing Group Inc. 561 E. Elliot Road, Chandler, Arizona, 85225, Tel: (480) 892 1399

The stop condition can occur at any time and terminates any operation that may be in progress.

The LFAFE is selected with the first data bit being a 1. The next bit specifies a read (0) or a write(1) operation followed by a 4 bit address. If a write operation is specified the following bits are read in to the selected register, *high bit first.* If a read operation is selected the LFAFE pulls SDA low when the data is ready to be transmitted and the data bits are then clocked out following the negative SCL transition.

There are 14 logical registers, 8 real read/write registers (LD1 LD6, DLY and OC) and 6 "sensor reading" read-only registers (CII 1 CH6). The 8 real registers are the 6 SENSOR (or current drive) registers, a delay register and an oscillator compensation register. These registers are initialized by the host with the corresponding calibration values stored in the neighboring EEPROM. The 6 sensor reading registers are not actual registers. A read operation of one of these pseudo registers causes the LFAFE to take a reading of the sensor specified by the address and return this value as the data portion of the read operation. The take-readings operation is triggered by the negative transition of SCL of the last address bit. The LFAFE pulls the SDA line low when the reading has been taken and the data is ready to be clocked out.

The following table (FIG. 2-18c2) lists the available commands. The SDA bits driven by the LFAFE are underlined.

FIG. 2-18c1

	Select	R/W	Address	Ready	Data
Read SENSOR Drive Registers 1-6					
	0	0	0000	0	LLLLLLLL
	0	0	0001	0	LLLLLLLL
	0	0	0010	0	LLLLLLLL
	0	0	0011	0	LLLLLLLL
	0	0	0100	0	LLLLLLLL
	0	0	0101	0	LLLLLLLL
Read Delay Register					
	0	0	0110	0	DDDDD
Read Oscillator					

FIG. 2-18c2

Register					
	0	0	0111	<u>0</u>	<u>SSSSS</u>
Register Table continued.					
Obtain Current Readings from Channel 1-6					
	0	0	1000	<u>0</u>	<u>RRRRRRRR</u>
	0	0	1001	<u>0</u>	<u>RRRRRRRR</u>
	0	0	1010	<u>0</u>	<u>RRRRRRRR</u>
	0	0	1011	<u>0</u>	<u>RRRRRRRR</u>
	0	0	1100	<u>0</u>	<u>RRRRRRRR</u>
	0	0	1101	<u>0</u>	<u>RRRRRRRR</u>
Undef.					
	0	0	1110		
	0	0	1111		
Write output current drive registers					
	0	1	0000		LLLLLLLL
	0	1	0001		LLLLLLLL
	0	1	0010		LLLLLLLL
	0	1	0011		LLLLLLLL
	0	1	0100		LLLLLLLL
	0	1	0101		LLLLLLLL
Write Delay Register					
	0	1	0110		DDDDD
Write Osc.					

FIG. 2-18d

Register					
	0	1	0111		SSSSS

After a read operation, SDA is released to a high state following the last output bit. A write to a register occurs after the rising edge of the last data bit clocked in. Additional data bits clocked in after a write operation are either ignored or treated as a new command or used to write the next real register.

Normal Operation

The host micro-controller initializes the LFAFE by reading the calibration values from the EEPROM. This is achieved by generating a start condition, clocking in a 0 data bit at which point the LFAFE will pull the EEPROM's chip select pin high. The host can now communicate with the EEPROM since its CS pin is high and the LFAFE is ignoring SDA and SCL apart from waiting for a stop condition. Once the FEPROM has been read, the host issues a stop condition, at which point the LFAFE pulls the EEPROM's CS pin low. The host then issues another start condition followed by a 1, followed in turn by the address of the LDl register, 0000. This is followed by the 8 data bits to be written to LD 1. Then a stop condition is issued. LD2 through OC are written in the same fashion to complete the initialization sequence.

During normal operation, the host will obtain a set of readings from the LFAFE by issuing a set of read commands in order. Detailing this sequence, the host first issues a start condition followed by a 1 to select the LFAFE. Then a 0 will be issued indicating a read followed by the first sensors pseudo register's address, 1000. The host leaves the SCL signal low and lets SDA go high and waits for the LFAFE to pull SDA low to indicate the take-reading operation is completed and the reading is available. The host then drives SCL to clock the data bits out of the LFAFE and finishes with a stop condition. This process is repeated for sensors 2 through 6.

The host can issue a stop condition to terminate the take reading operation prematurely. This major be useful for situations where the current drive may be causing a brown-out in low power situations.

See FIG. 2-18e2 for LFAFE operation timing diagram

FIG. 2-18e1

LFAFE operation timing diagram

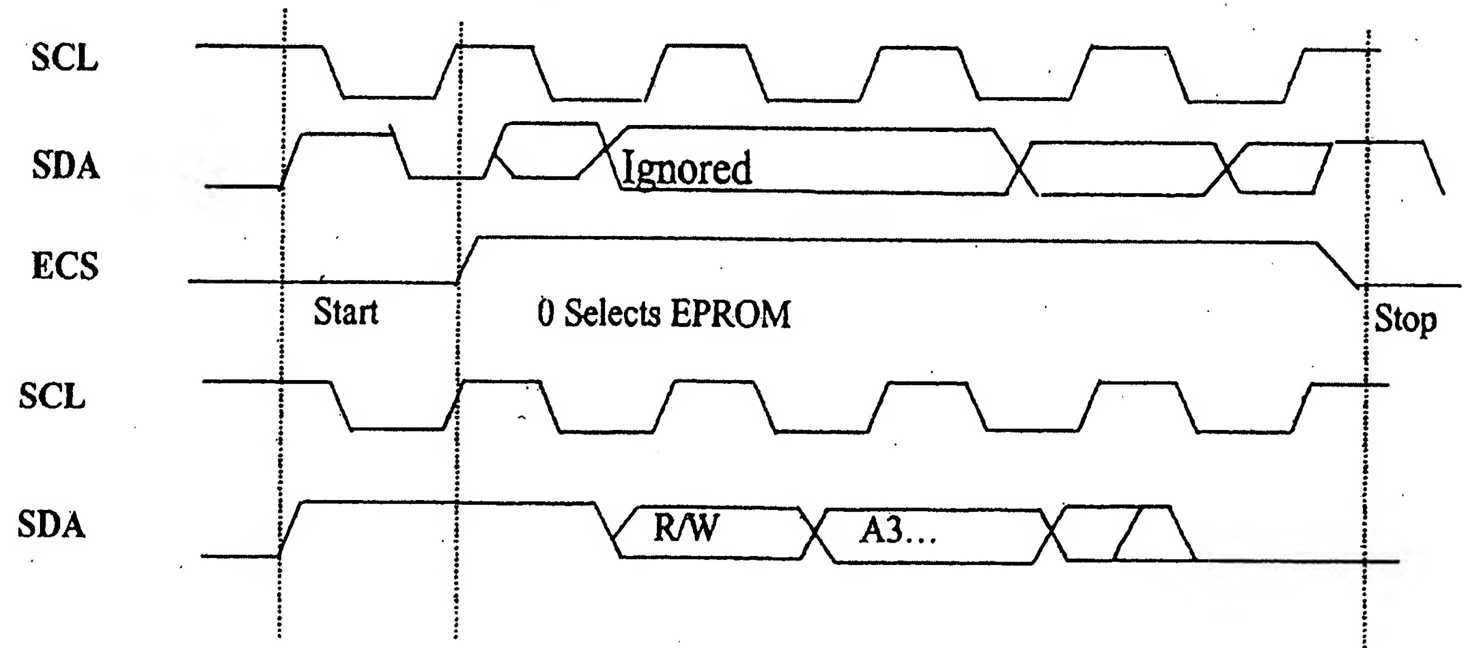


FIG. 2-18e2

ECS Start I Selects LFAFE Stop

Summary of Operation

The LFAFE generates two current drives. These drives are used to power drive elements. The drive element state is sensed by a set of sensors. The sensor output, current is sensed by an amplifier which pre-conditions the outputs for A/D conversion. The LFAFE does a A/D conversion and stores the output into a register for transmission to the outside world on command. The current drives are determined by a DAC and the reference current is determined by a voltage reference and a reference resistor. Registers are provided for storage and control of the operation. An oscillator sets the timing of the operation. A few external components are needed such as the oscillator capacitance, the current setting resistor, the sample and hold capacitance and the gain setting resistor. Other components for system level operation are the FEPROM which stores calibration coefficients and the host micro-controller which is a 8 bit uC.

Electrical Specifications:

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Units
Voltage at any pin	VMAX	7.0	Volt
Current at any pin	IMAX	100	mA
Operating Temperature	TMAX	100	Deg C
Storage Temperature	TST	160	Deg C
Soldering Temperature for 10 sec	TSOL	300	Deg C

Note: Sustained operation at or above these ratings may cause permanent damage to the device.

STATIC ELECTRICAL PARAMETERS

Parameter	Conditions	Min	Typ	Max	Units
VDD Supply	Operating	4.5	5.0	5.5	Volt
IDD Supply current	Except for current drive			2.5	mA
Temperature	Operating	0		70	Deg C

FIG. 2-18f

Voltage Reference	Max at REG output, depends on DAC output.			3.6	Volt
DIGITAL SPECIFICATIONS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
CMOS High Level Output VOH	Iout=10uA	VCC-0.5			Volt
CMOS Low level Output VOL	Iout=100uA			0.5	Volt
CMOS High Level Input VIH		VCC-0.5			Volt
CMOS Low Level Input VIL				0.5	Volt
Clock rate				1	MHz
Data Length				20	Bits
CS Hold time				500	ns
CS Setup time				500	ns
Register File Rows				8	
Register File Columns				8	
Register read/write setup time				500	Ns
Register read/write hold time				500	Ns
Delay Time		50		3200	ms
OSCILLATOR CHARACTERISTICS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
OSC frequency range		100		500	KHz
OSC frequency tolerance	Trimmed OSC			2.5	%
OSC Capacitance.			560		pF

Note: The oscillator requires an external capacitance which determines the frequency. The oscillator provides timing for the A/D Conversion and the delay.

FIG. 2-18g

TRACK AND HOLD CHARACTERISTICS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Hold Capacitance		50	100	220	nF
Settling Time		200	300	600	usec

A/D CHARACTERISTICS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
A/D resolution			10		Bits
A/D conversion time	OSC Frequency dependent				
A/D linearity			1		LSB
A/D FSR				3.6	Volt

CURRENT DRIVE CHARACTERISTICS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Current Rise Time		500			ns
Current fall Time		500			ns
Current	Operating	2.0		30.0	mA
Current Turn ON time	To 90% of max			25.0	us
Current Turn OFF time	To 10% of max			25.0	us

SENSED CURRENT OR FEEDBACK CHARACTERISTICS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Input sense current			25.0	500.0	uA

Availability and options for applications:

The LFAFE device is available either as packaged devices or die for COB mounting.

FIG. 2-18h

For a full custom application the LFAFE device can be integrated as a custom device with a 'HC05 micro-controller to generate a new device. This is a full custom development option at the customer's request only.

Typical Applications: 3-D graphics input device, 3-D game controllers, serial input devices, appliances, sensor interfaces, smart lighting, toys and games.

FIG. 2-18i

Replacement Sheet

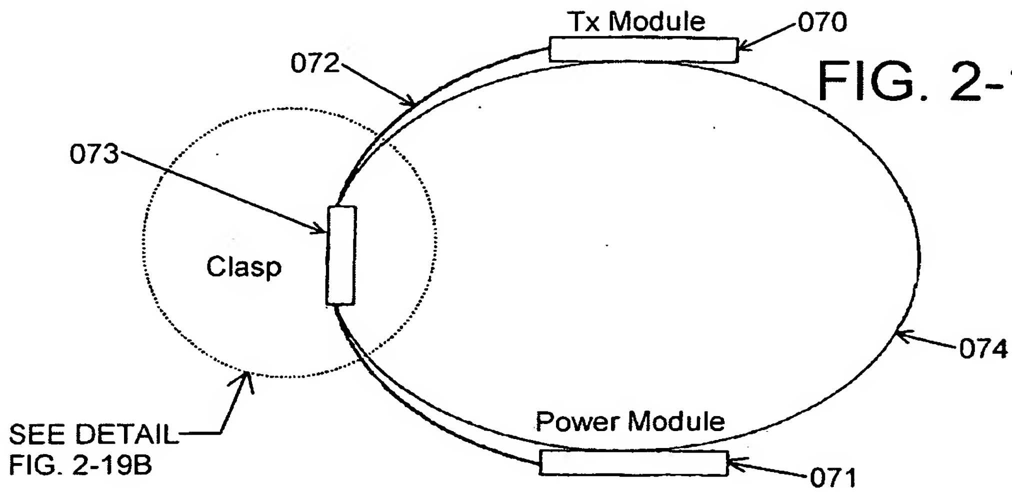


FIG. 2-19A

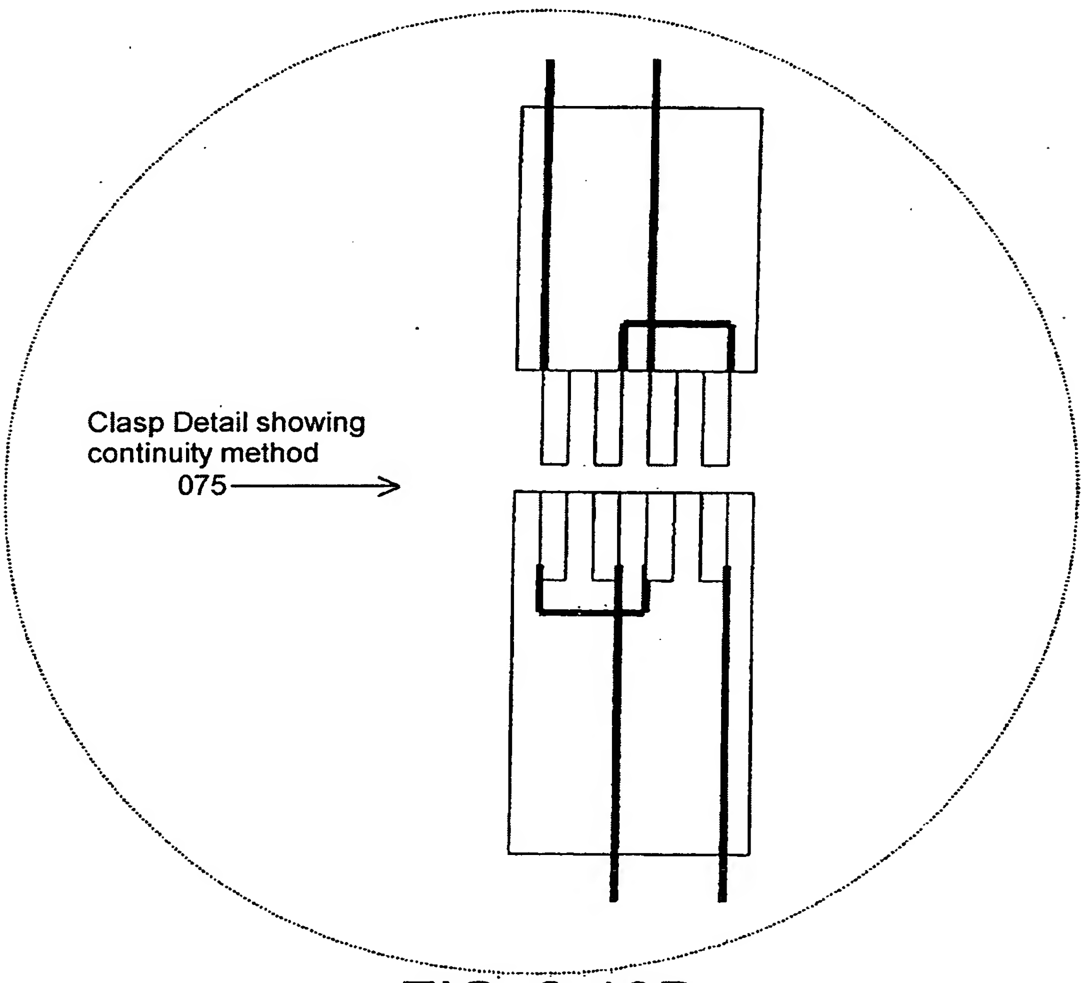


FIG. 2-19B

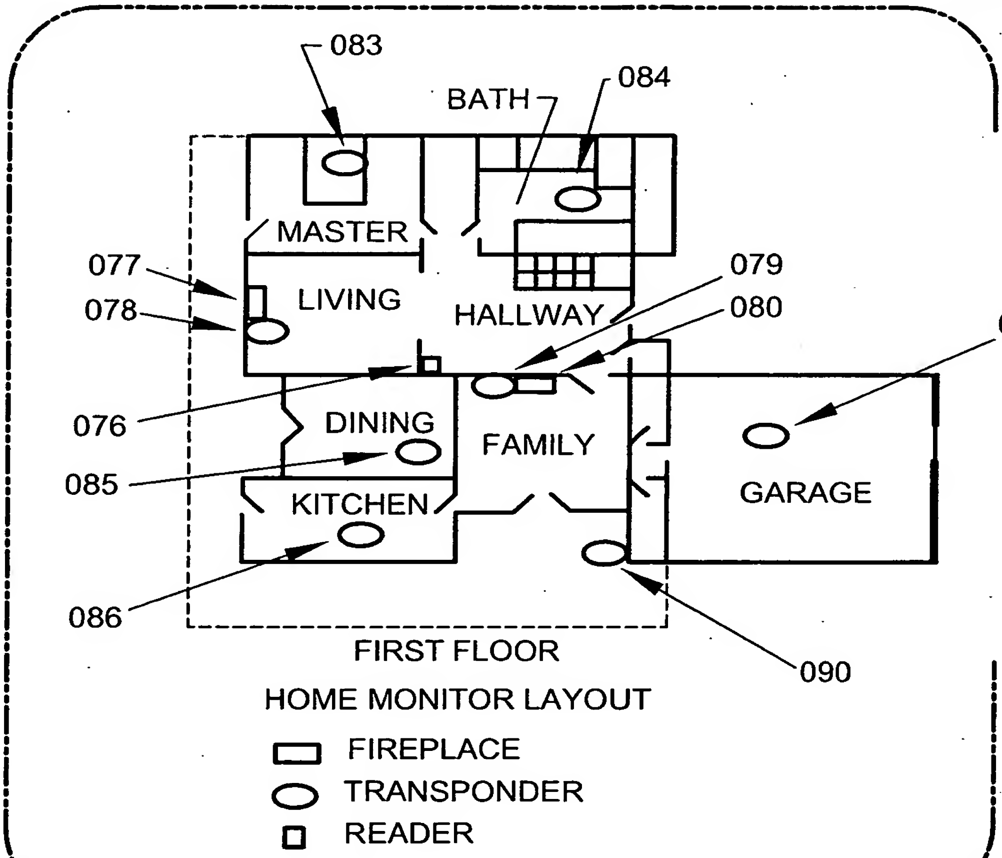


FIG. 2-20A

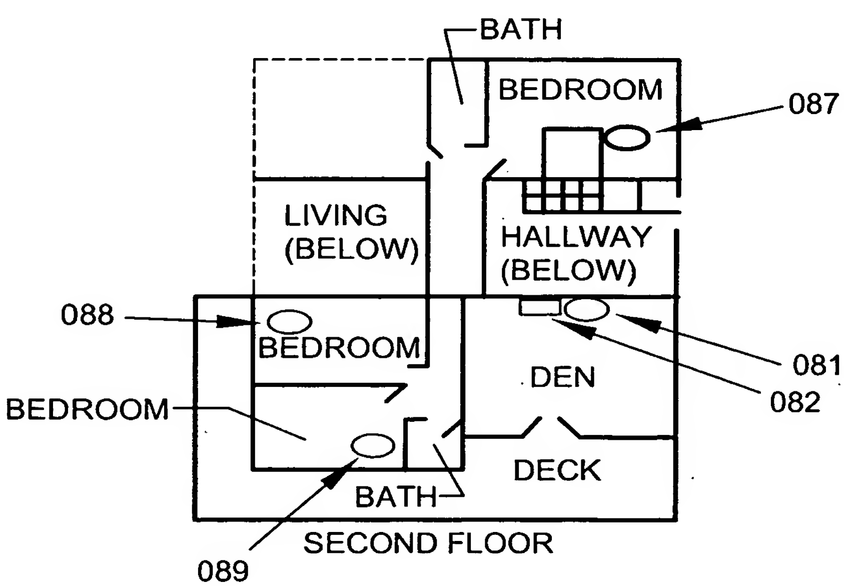


FIG. 2-20B

RadioData Corporation

7-ELEMENT YAGI ANTENNA SPECSIFICATIONS

1.0 Introduction & Scope

This specification applies to a High Gain Yagi Antenna that provides the ability to extend the range of the RadioData Reader to cover large areas.

2.0 **Product Overview**

The 7-element Yagi antenna provides high gain for large area coverage and needs to be used in orthogonally mounted pairs in order to provide the necessary diversity to minimize the read range variability that otherwise will occur with random tag orientation. Read Ranges can be in excess of 800 feet with Spider Tags in a line of sight, open field environment.

The low profile and "EverSealed" feed reduces the vulnerability of the antenna to the impact of a harsh environments and the computer-optimized design combines maximum performance with survivability, resulting in outstanding durability.

3.0 Specifications

Frequency Range:	290 to 310 MHz
Gain	9 dBd minimum
Front to Back Ratio	18 dB minimum
VSWR *(50* ohms)	1.2:1 typical
Bandwidth (1.5:1)	20 MHz minimum
Beamwidth (3dB)	E Plane 49 DEGREE, H Plane 600
Stacking Distance	B Plane 39.5", H Plane *32.5"*
Termination:	1 foot, RG58 coax with N-type male connector
Material:	Aluminum
Boom Length:	4.2 feet
Mast (mount) Diam.:	1.25 to 2.00"
Wind Surface Area:	0.4 sq. feet
Wind Survival:	125 mph
Weight:	2.25 lbs

4.0 Available Accessories

The antenna comes with all necessary mounting hardware. A kit includes two antennae with two 15' RG58 coax cables having SMA and N-type connectors,

FIG. 2-21

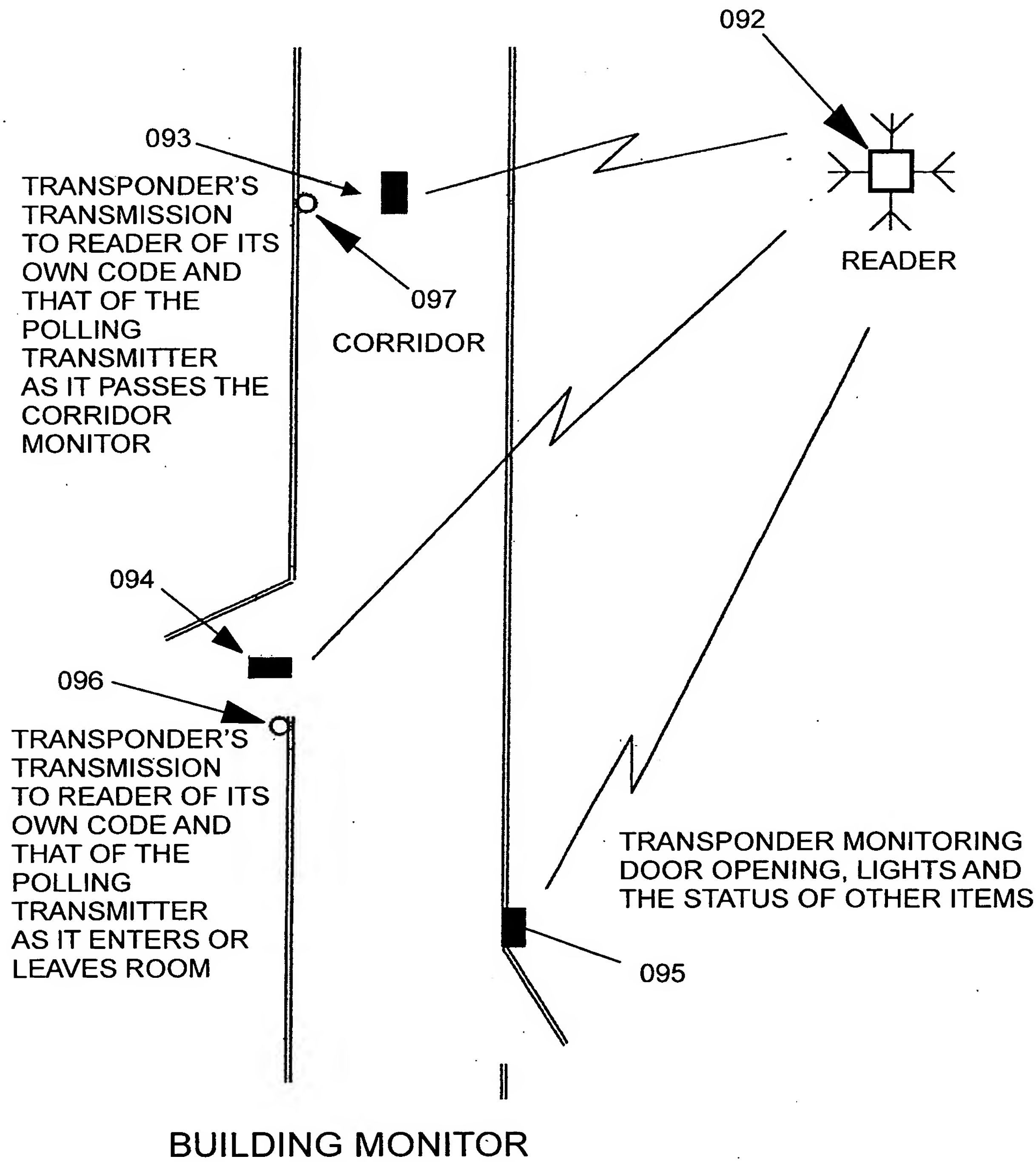

092
093
TRANSPONDER'S TRANSMISSION TO READER OF ITS OWN CODE AND THAT OF THE POLLING TRANSMITTER AS IT PASSES THE CORRIDOR MONITOR
097
CORRIDOR
READER
094
096
TRANSPONDER'S TRANSMISSION TO READER OF ITS OWN CODE AND THAT OF THE POLLING TRANSMITTER AS IT ENTERS OR LEAVES ROOM
TRANSPONDER MONITORING DOOR OPENING, LIGHTS AND THE STATUS OF OTHER ITEMS
095
BUILDING MONITOR

FIG. 2-22

Replacement Sheet

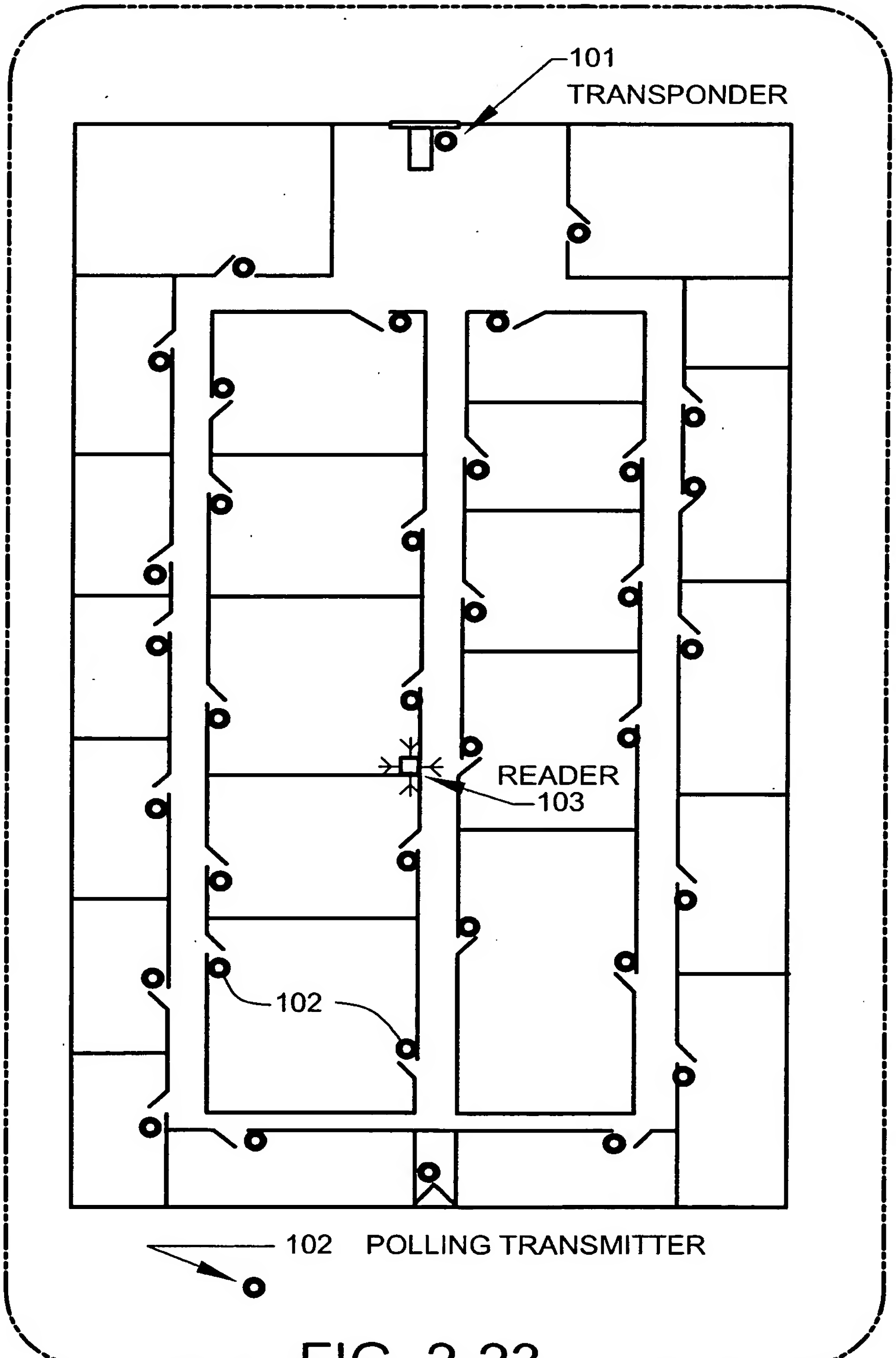


FIG. 2-23

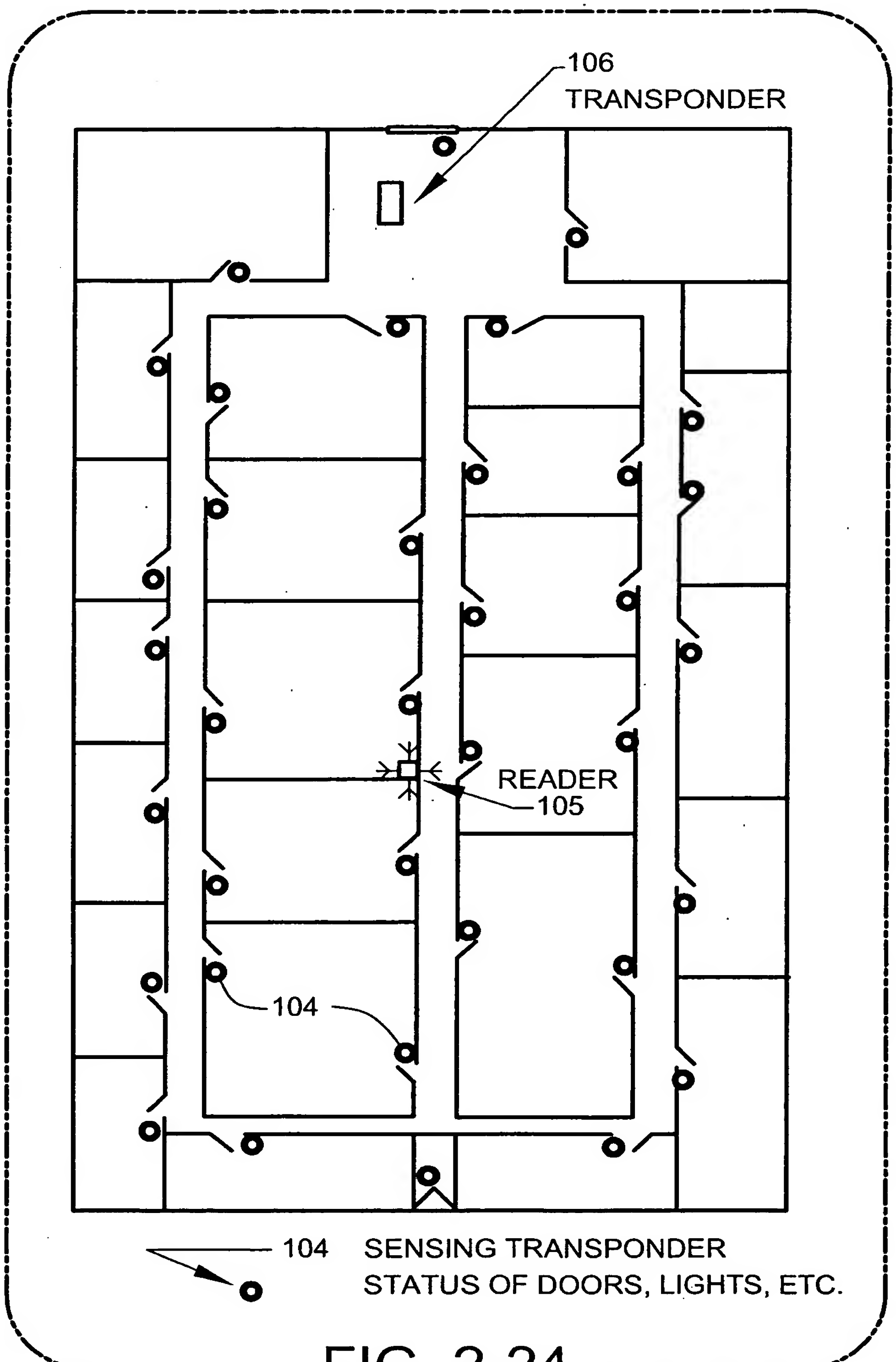

106
TRANSPONDER
READER
105
104
104 SENSING TRANSPONDER
STATUS OF DOORS, LIGHTS, ETC.

FIG. 2-24

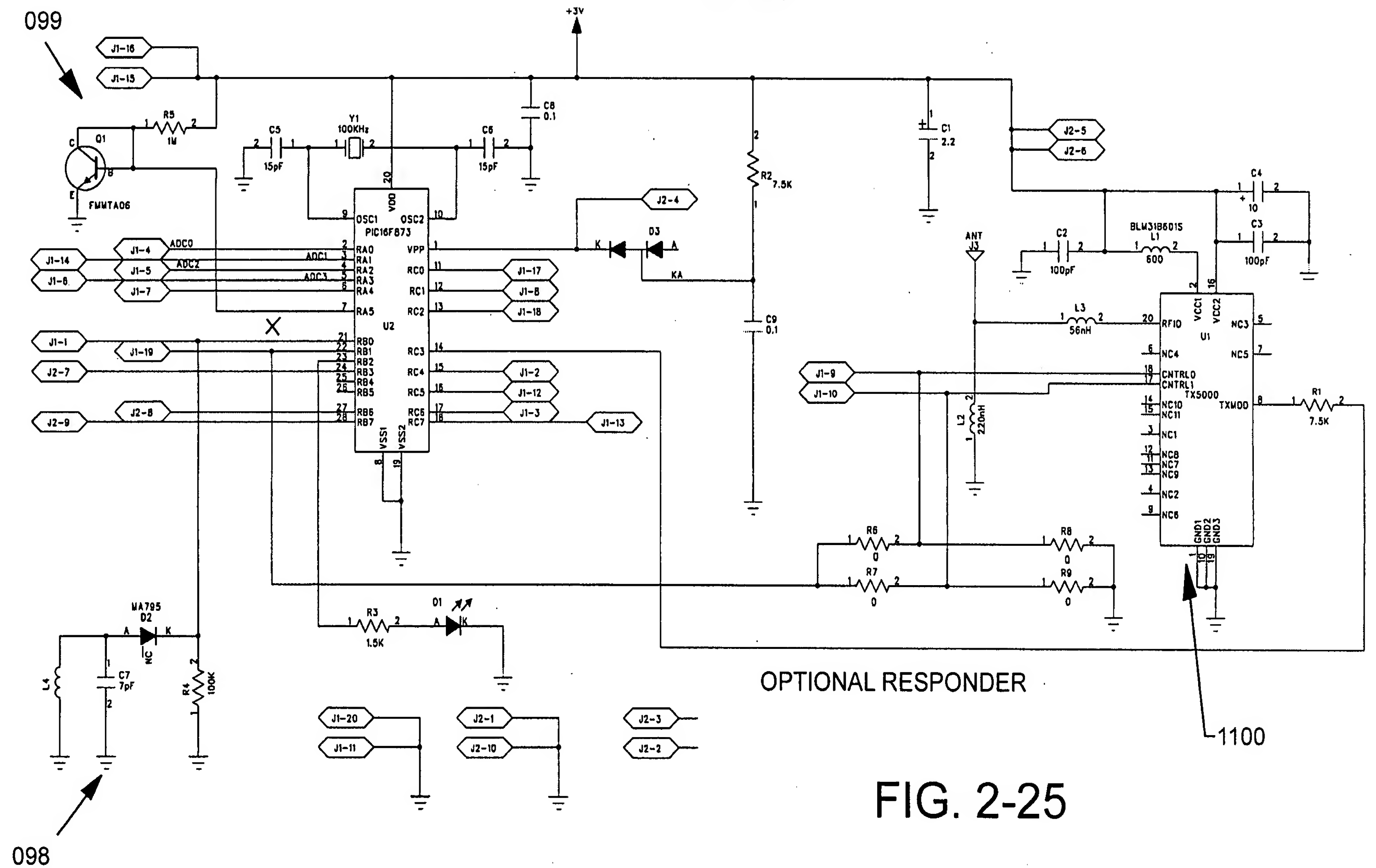

099
098
1100
OPTIONAL RESPONDER
PIC16F873
U2
TX5000
U1
+3V
ANT
J3
FMMTA06
Q1
R5 1M
Y1 100KHz
C5 15pF
C6 15pF
C8 0.1
R2 7.5K
C9 0.1
C1 2.2
C4 10
C3 100pF
C2 100pF
BLM31B601S
L1 600
L3 56nH
L2 220nH
R1 7.5K
R6 0
R7 0
R8 0
R9 0
D3
D1
R3 1.5K
MA795
D2
C7 7pF
R4 100K
L4

FIG. 2-25

RADIODATA CORPORATION			LITMIS SENSOR STATUS REPORT				MODEL DTO 10021
CHANGE FROM PRIOR REPORT			TRANSPONDER NOT REPORTING (LAST STATUS)				SENSING OF DOOR STATUS
TRANSPONDER CODE	GROUP	INDIVIDUAL	SENSOR A	SENSOR B	SENSOR C	SENSOR D	SENSOR E
01	ADFJ-1	132658	OPEN	CLOSED	CLOSED	OPEN	OPEN
02	ADFJ-1	132659	OPEN	OPEN	OPEN	OPEN	OPEN
03	ADFJ-1	132660	CLOSED	CLOSED	OPEN	OPEN	OPEN
04	ADFJ-1	132661	CLOSED	OPEN	CLOSED	OPEN	OPEN
05	ADFJ-1	132662	OPEN	OPEN	CLOSED	CLOSED	OPEN
06	ADFJ-1	132663	OPEN	OPEN	OPEN	OPEN	CLOSED
07	ADFJ-1	132664	OPEN	CLOSED	OPEN	OPEN	OPEN
08	ADFJ-1	132665	OPEN	CLOSED	CLOSED	OPEN	OPEN
09	ADFJ-1	132666	CLOSED	CLOSED	OPEN	CLOSED	OPEN
10	ADFJ-1	132667	OPEN	OPEN	OPEN	CLOSED	CLOSED
11	ADFJ-2	132745	OPEN	OPEN	OPEN	CLOSED	CLOSED
12	ADFJ-2	132746	OPEN	CLOSED	CLOSED	OPEN	CLOSED
13	ADFJ-2	132747	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
14	ADFJ-2	132748	CLOSED	OPEN	CLOSED	OPEN	OPEN
15	ADFJ-2	132749	CLOSED	OPEN	OPEN	OPEN	OPEN
16	ADFJ-2	132750	CLOSED	OPEN	OPEN	OPEN	CLOSED
17	ADFJ-2	132751	CLOSED	OPEN	CLOSED	CLOSED	OPEN
18	ADFJ-2	132752	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
19	ADFJ-2	132753	OPEN	CLOSED	OPEN	CLOSED	OPEN
20	ADFJ-2	132754	CLOSED	CLOSED	OPEN	OPEN	CLOSED
REPORT AC-10235			DATE JUNE 14, 2003		TIME 12:45 AM		STATUS BETA TEST 2A

FIG. 2-26

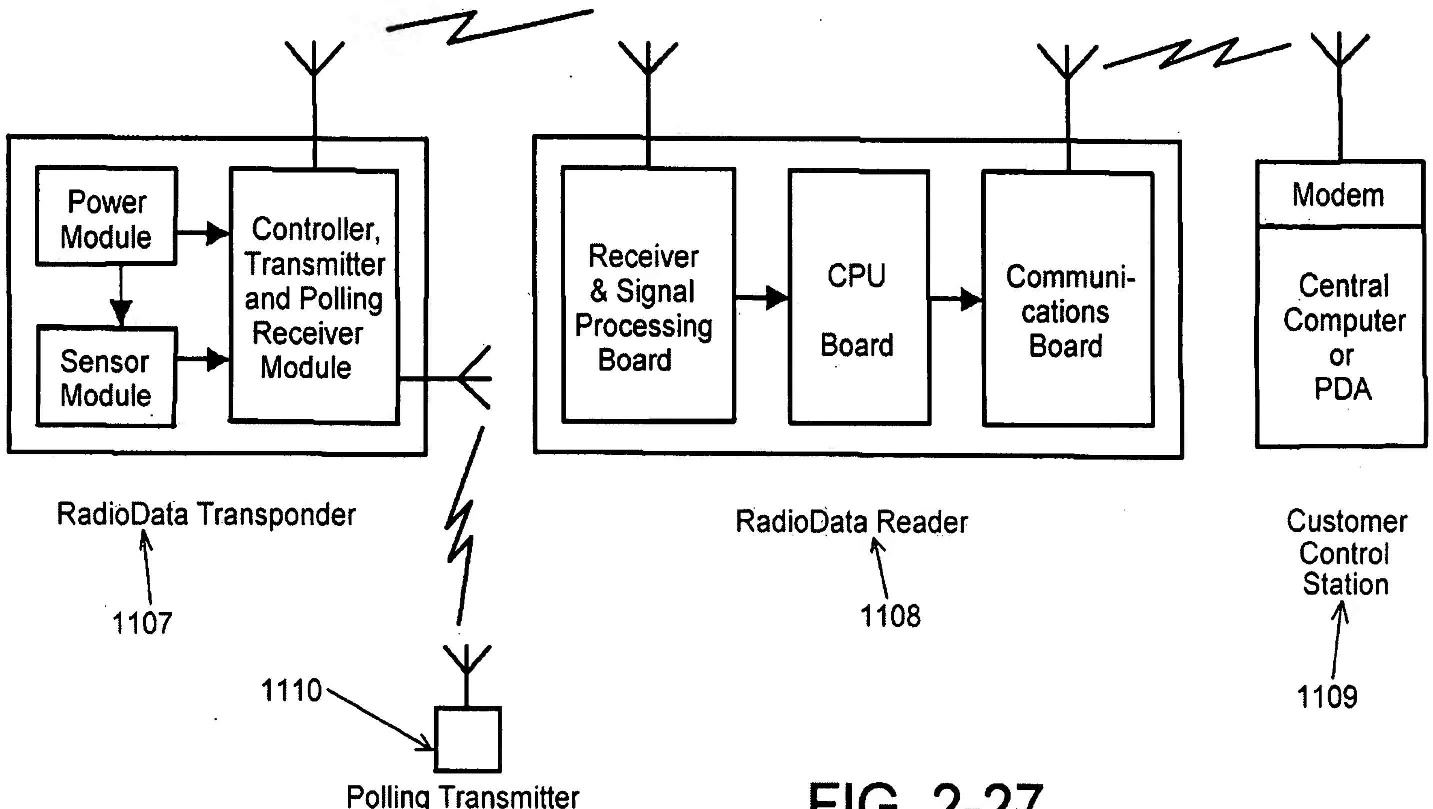

Power Module
Sensor Module
Controller, Transmitter and Polling Receiver Module
RadioData Transponder
1107
Receiver & Signal Processing Board
CPU Board
Communi-cations Board
RadioData Reader
1108
Modem
Central Computer or PDA
Customer Control Station
1109
1110
Polling Transmitter

FIG. 2-27

Replacement Sheet

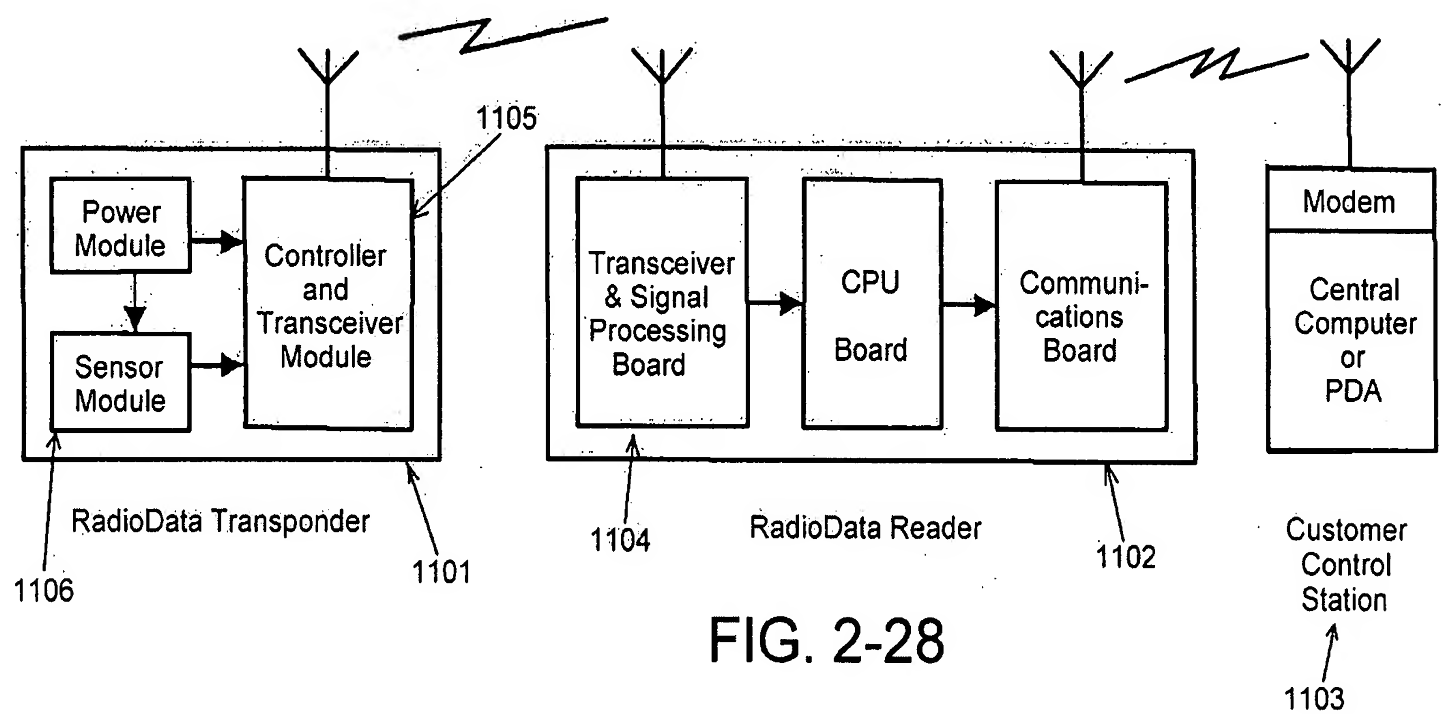


FIG. 2-28

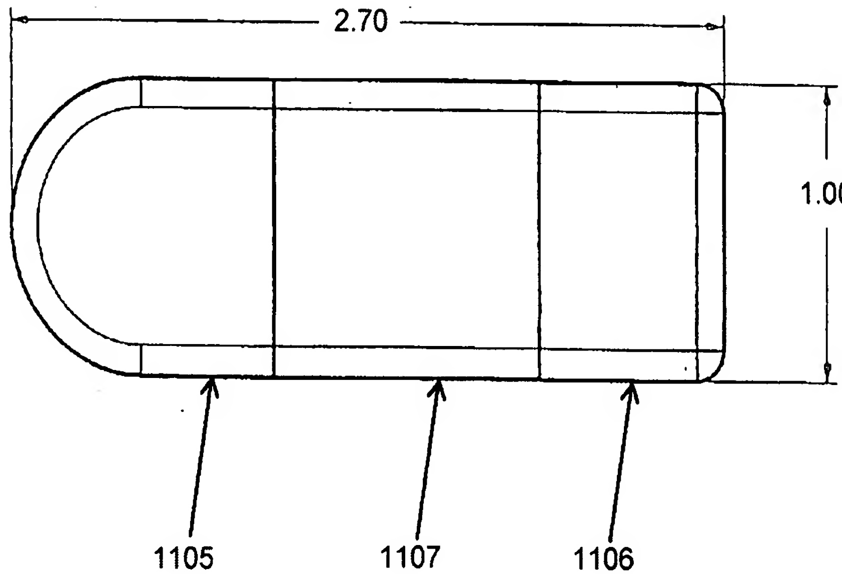


FIG. 2-29A

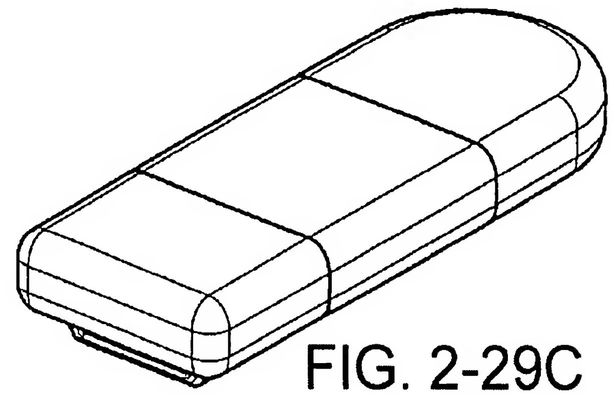


FIG. 2-29C

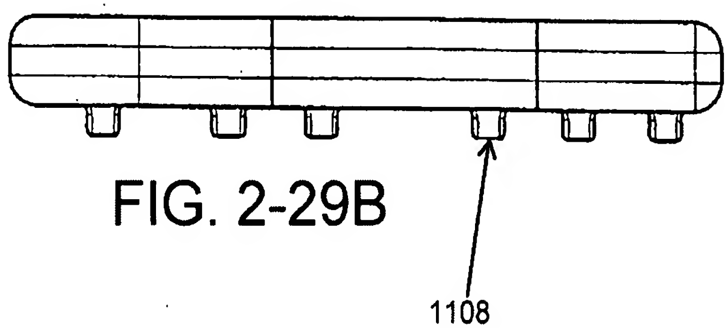


FIG. 2-29B

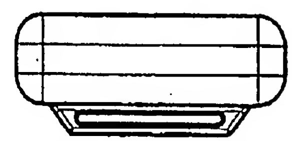


FIG. 2-29D

Replacement Sheet

FIG. 2-30

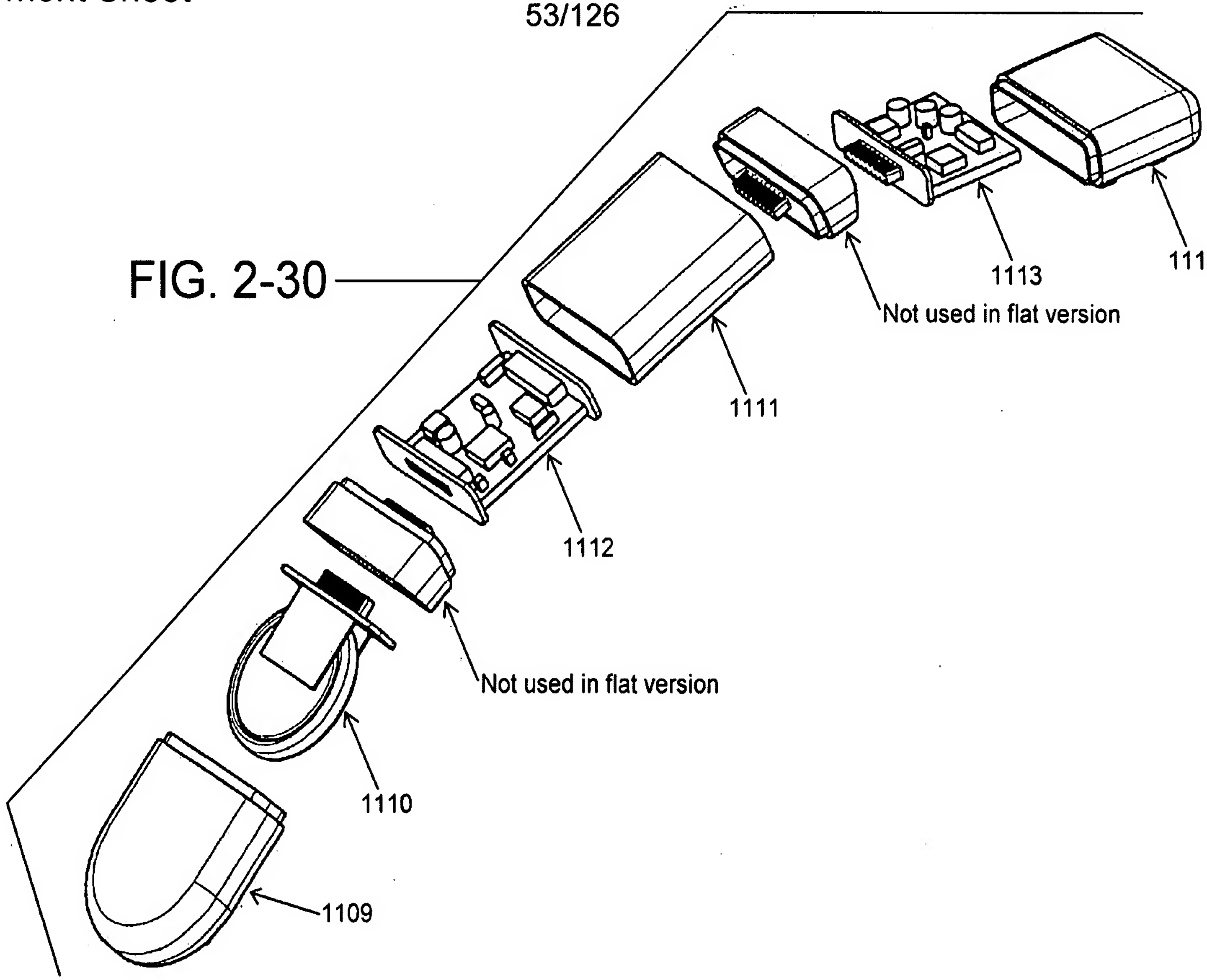


FIG. 2-31A

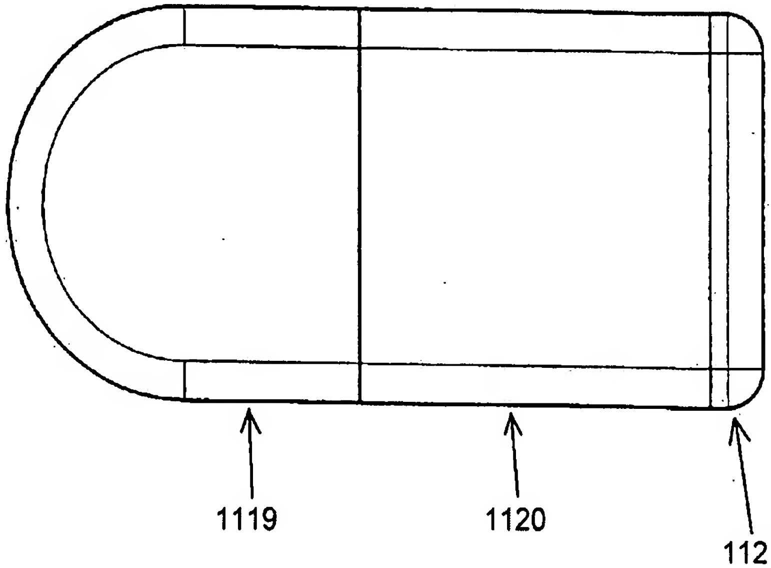
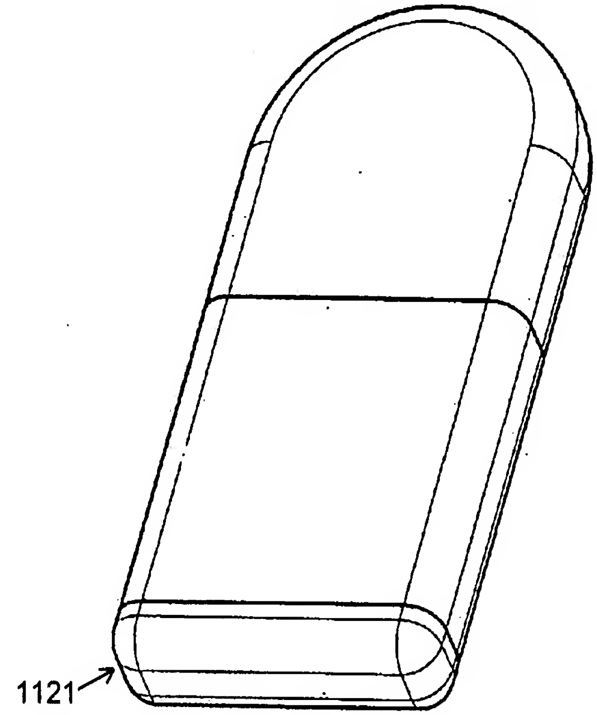


FIG. 2-31C



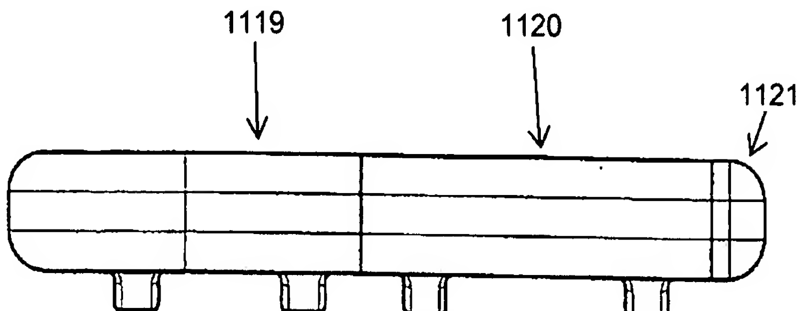


FIG. 2-31B

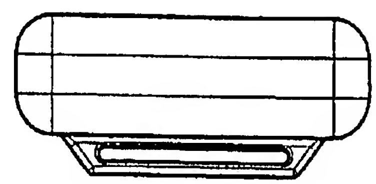
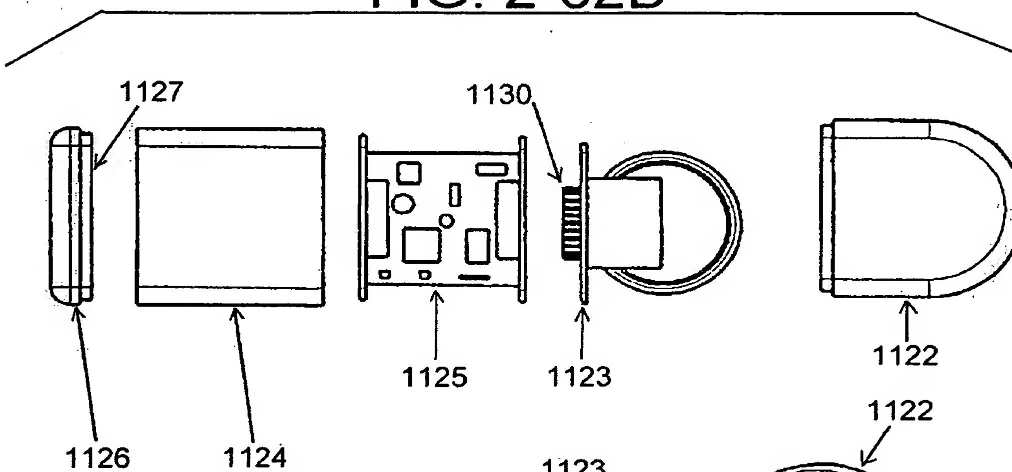


FIG. 2-31D

Replacement Sheet

FIG. 2-32B



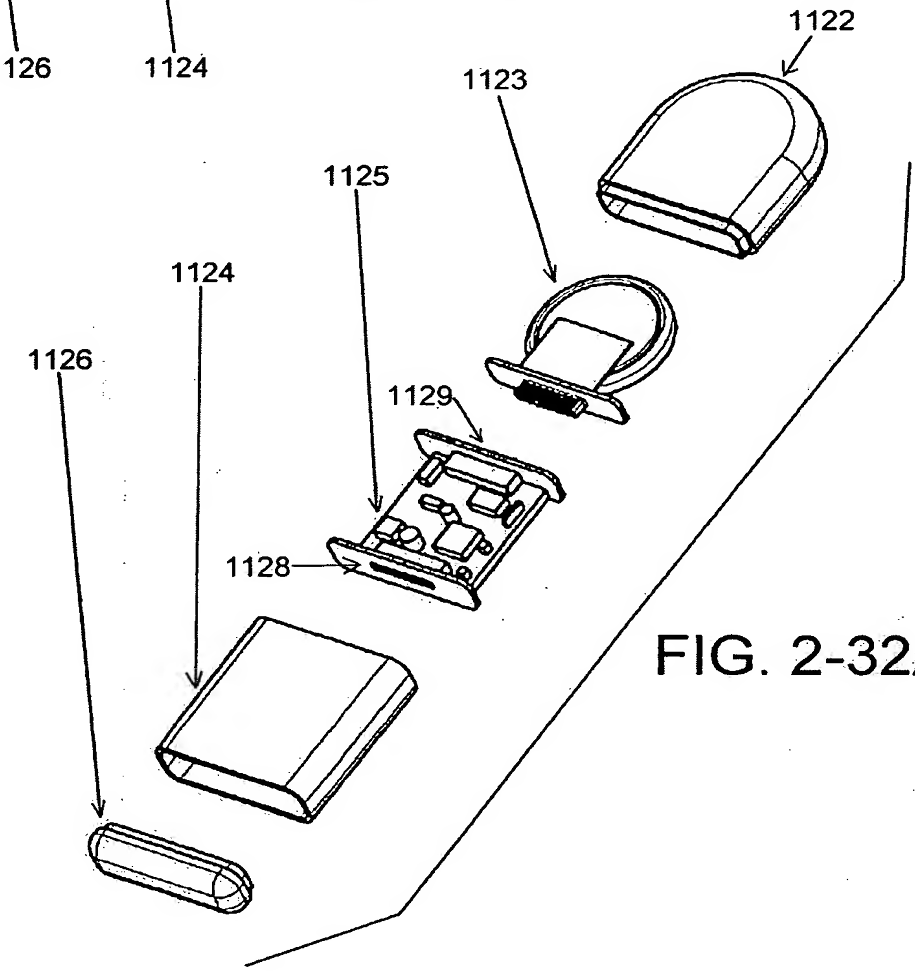


FIG. 2-32A

ASH Transceiver Block Diagram

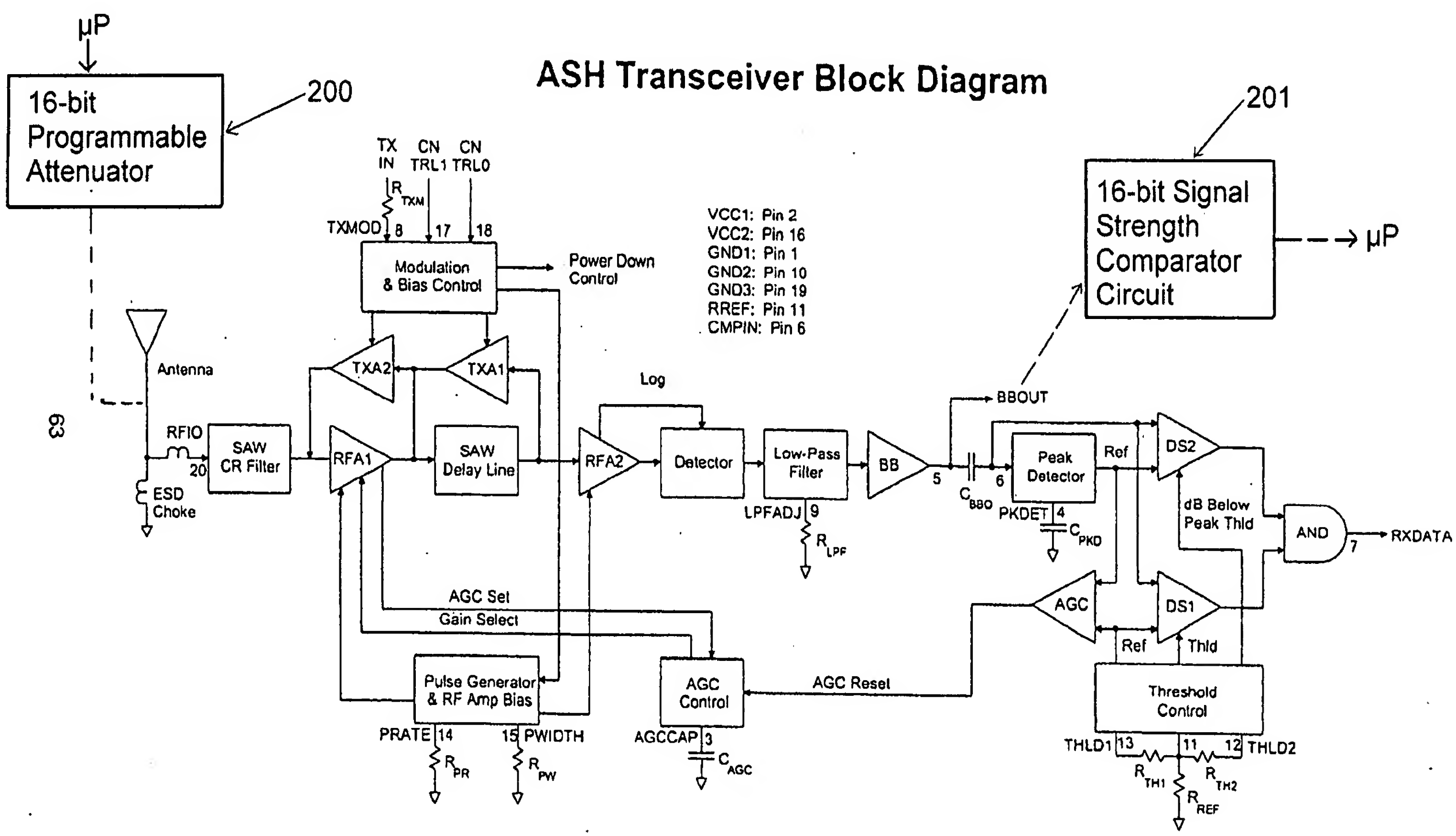
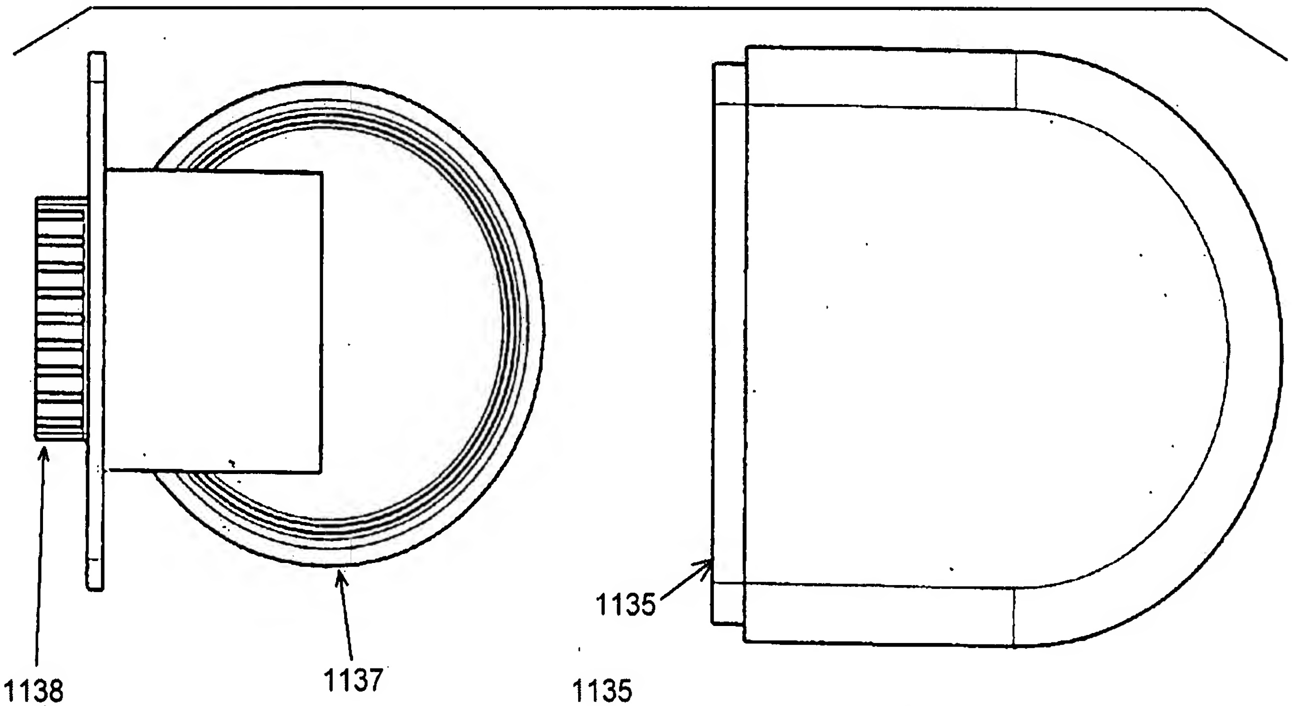


FIG. 2-33

FIG. 2-34B



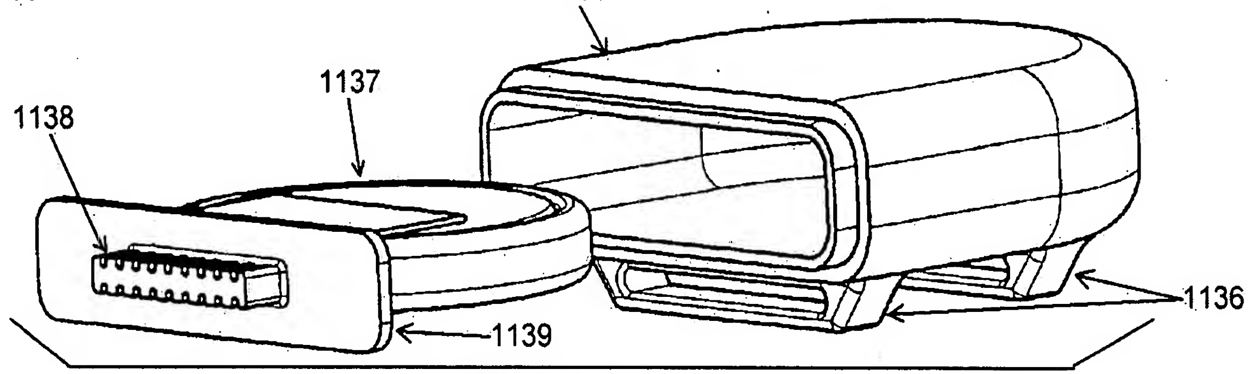


FIG. 2-34A

FIG. 2-35C

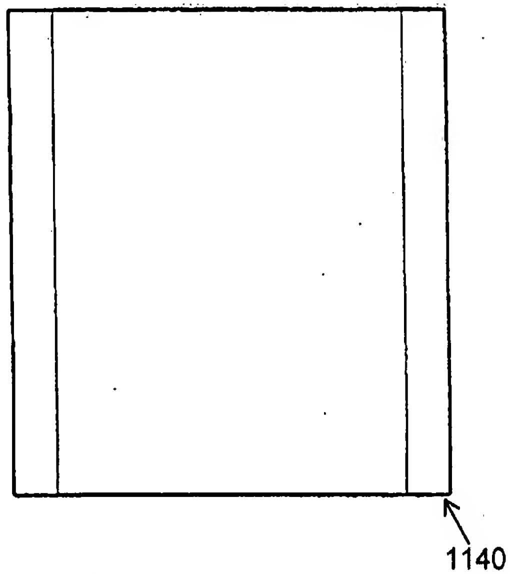
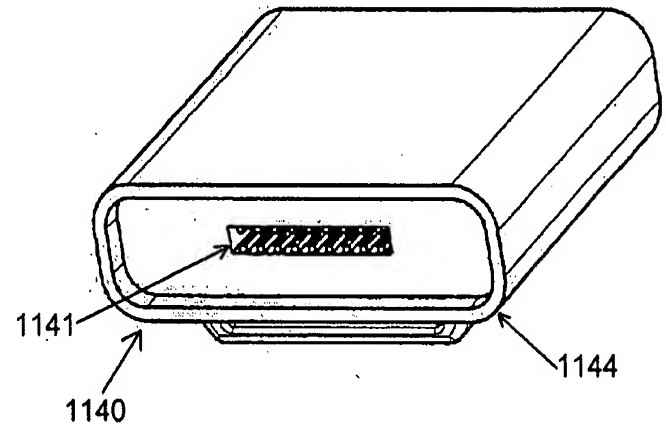


FIG. 2-35D



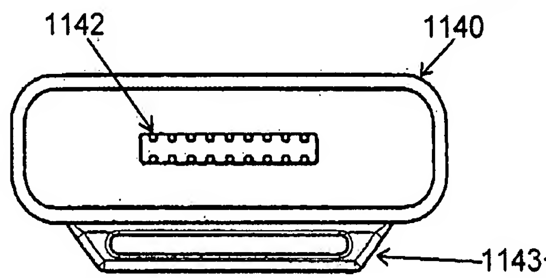


FIG. 2-35B

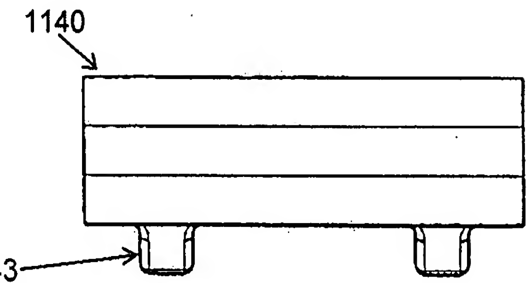


FIG. 2-35A

Replacement Sheet

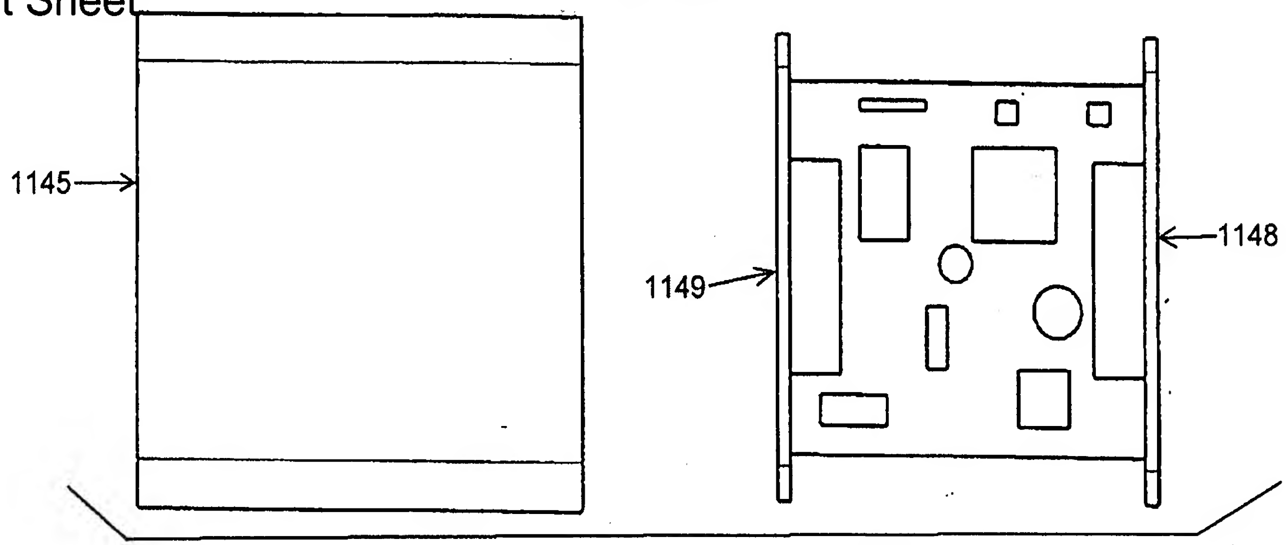


FIG. 2-36B

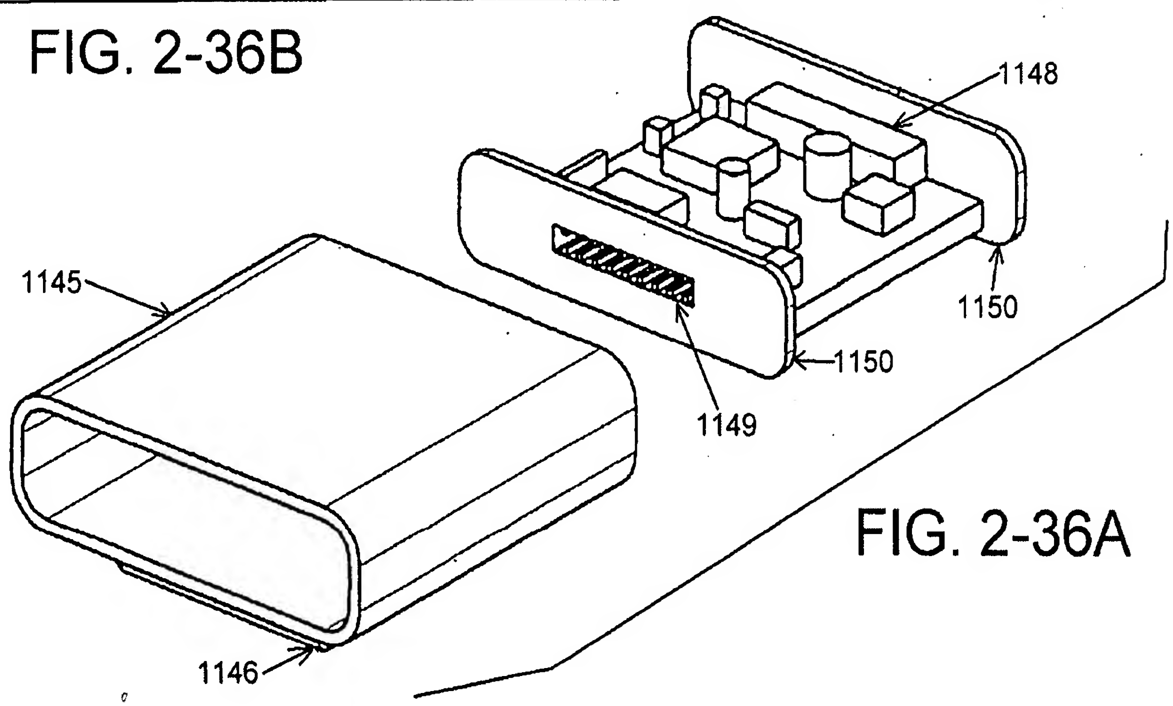


FIG. 2-36A

FIG. 2-37A

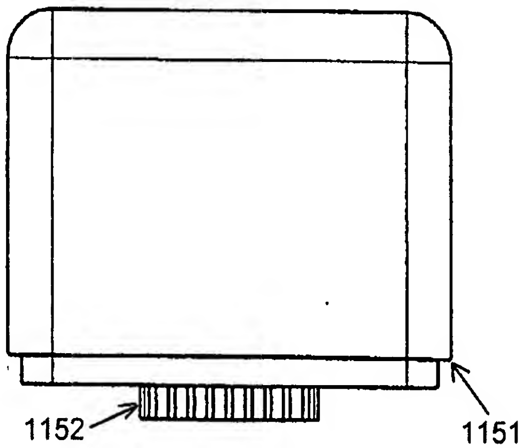
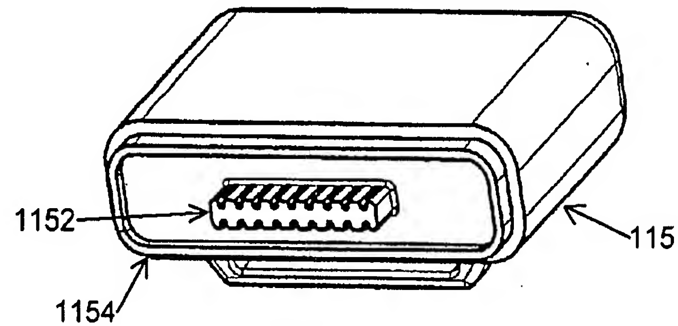


FIG. 2-37B



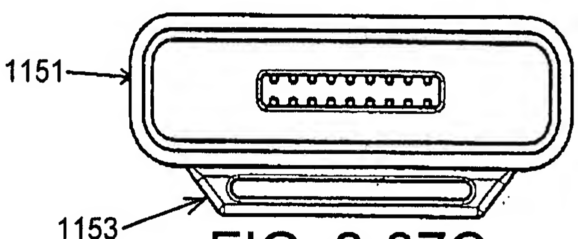


FIG. 2-37C

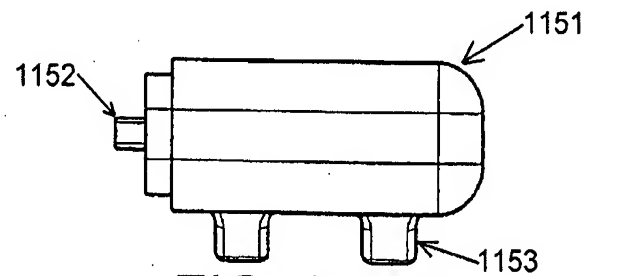
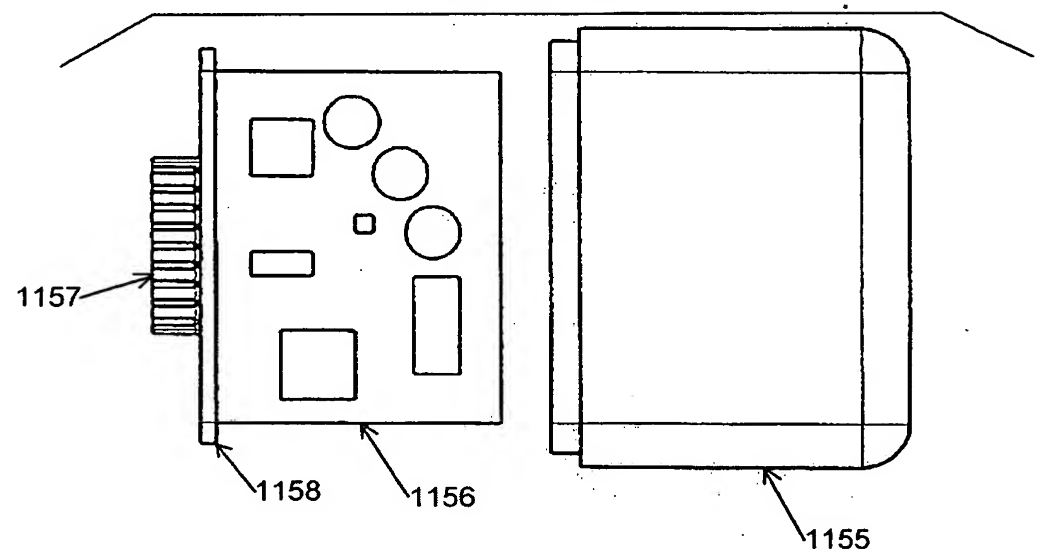


FIG. 2-37D

Replacement Sheet

FIG. 2-38B



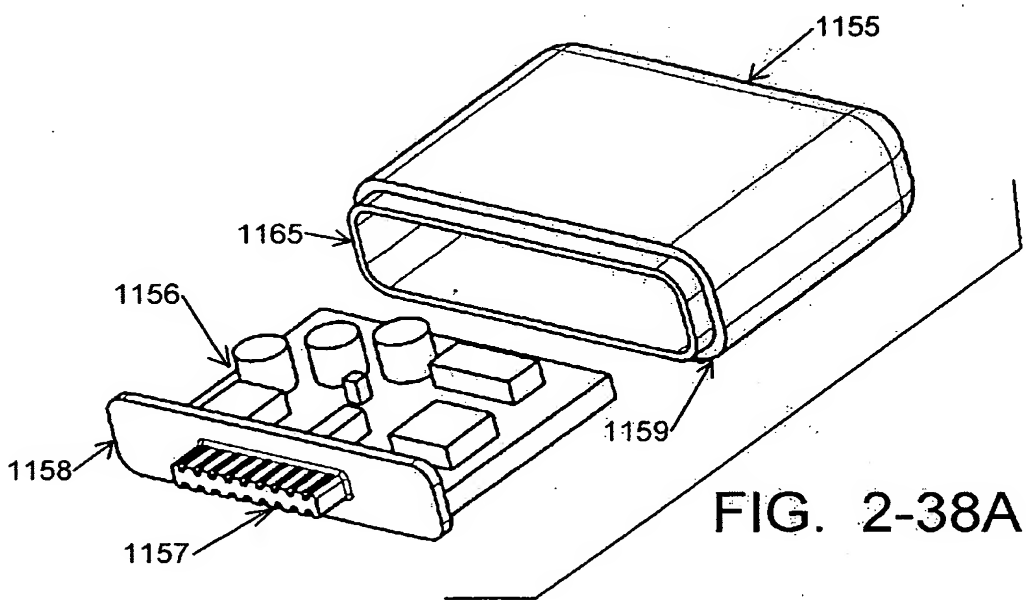


FIG. 2-38A

FIG. 2-39A

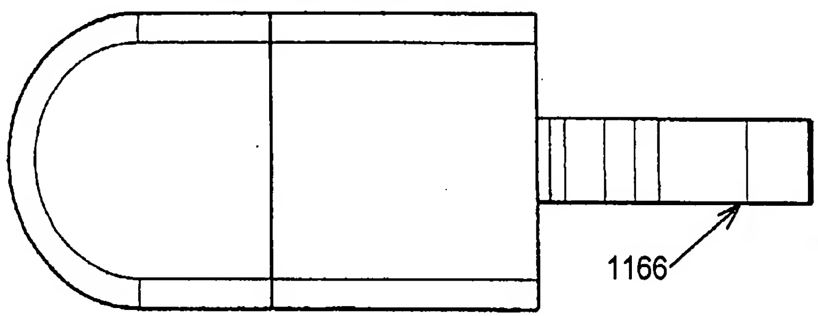
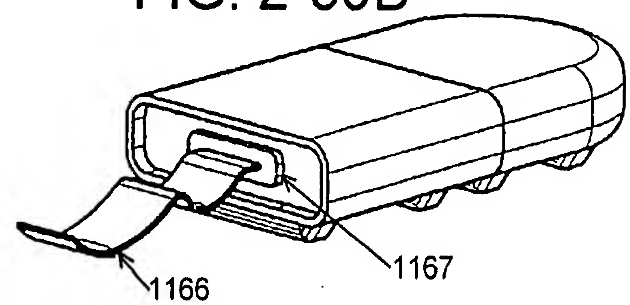


FIG. 2-39B



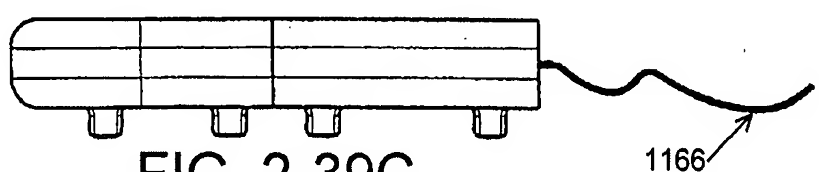


FIG. 2-39C

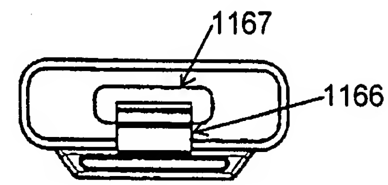


FIG. 2-39D

FIG. 2-40

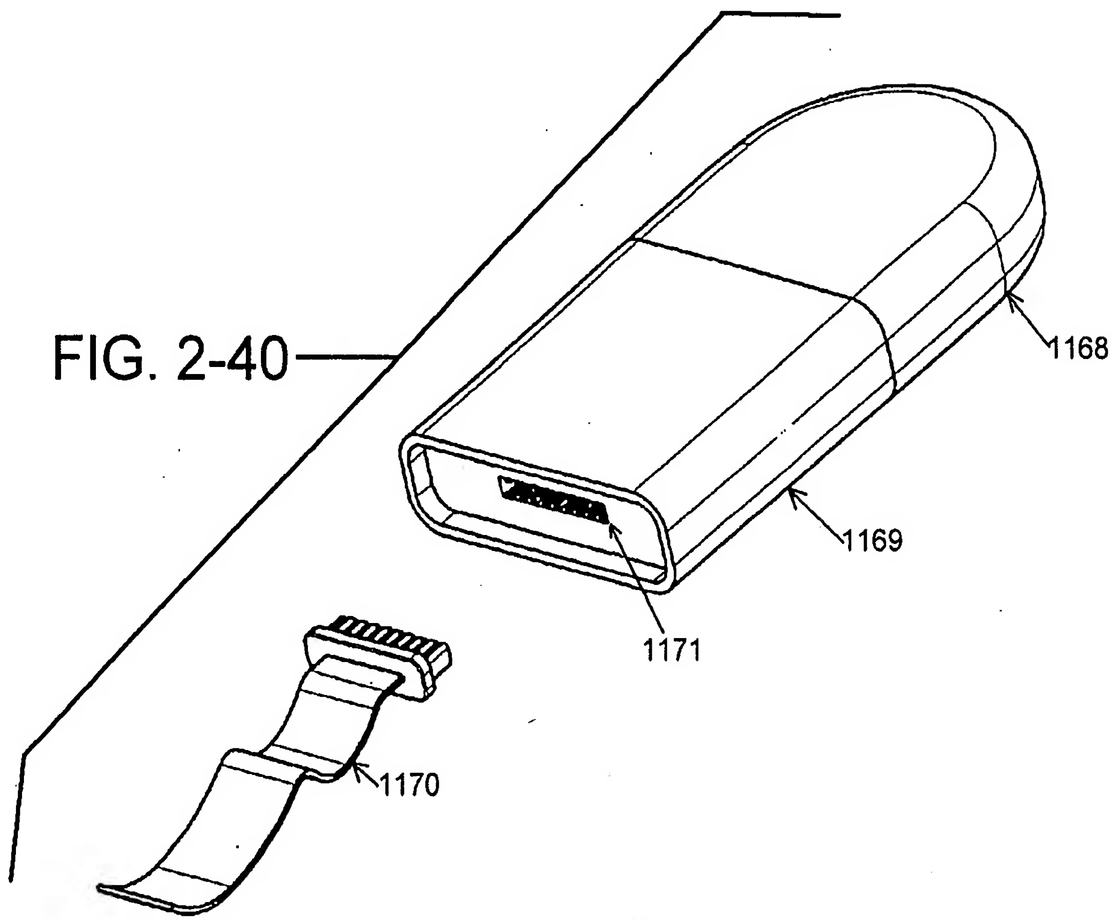


FIG. 2-41A

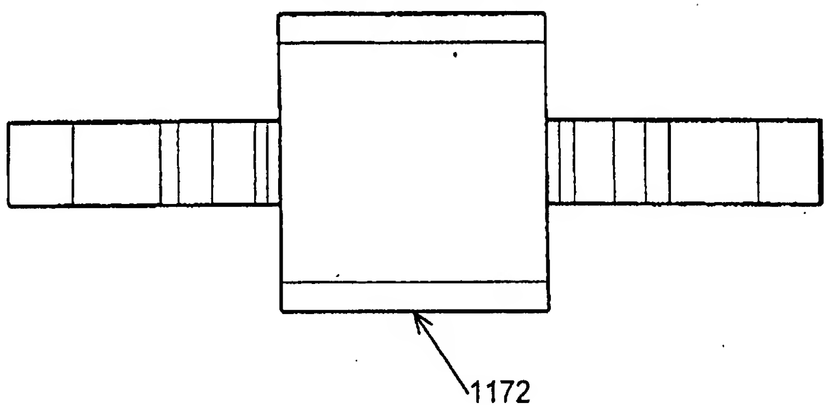
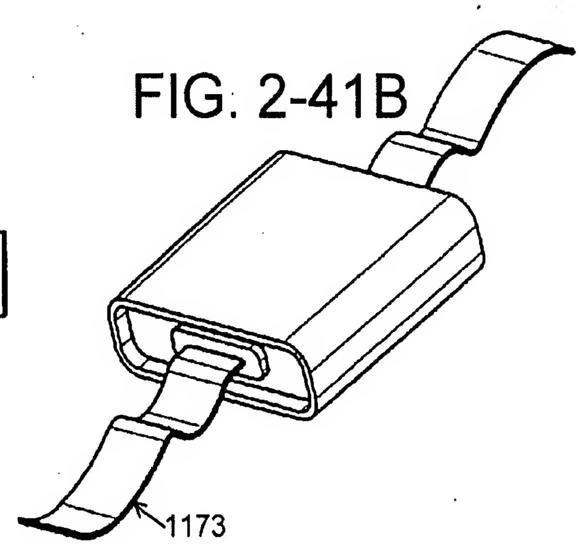


FIG. 2-41B



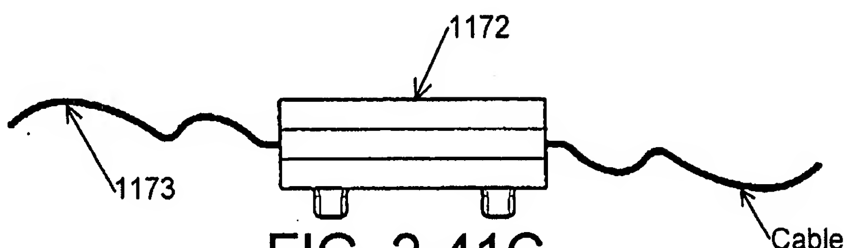


FIG. 2-41C

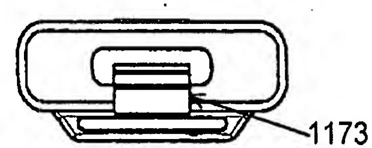
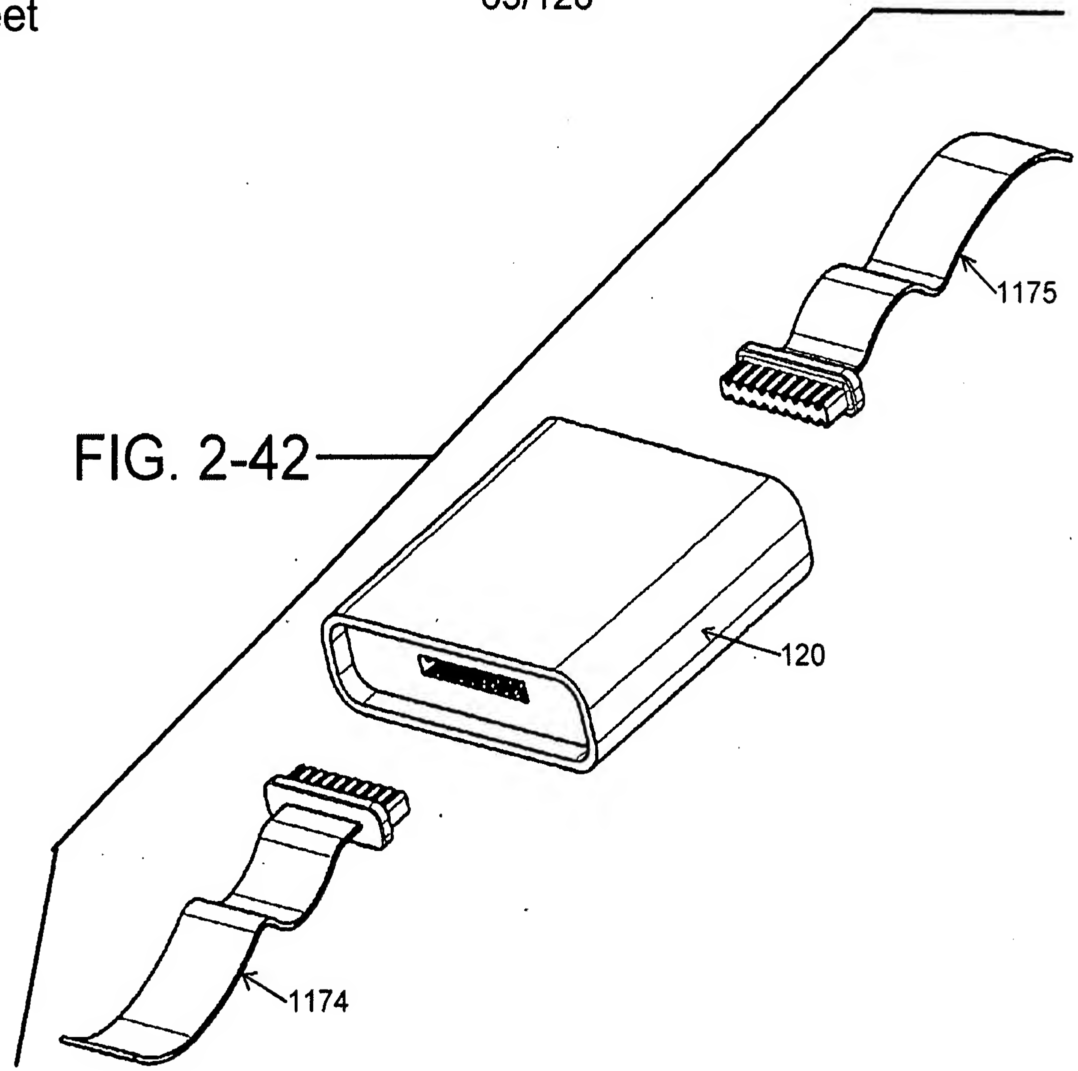


FIG. 2-41D

Replacement Sheet

FIG. 2-42



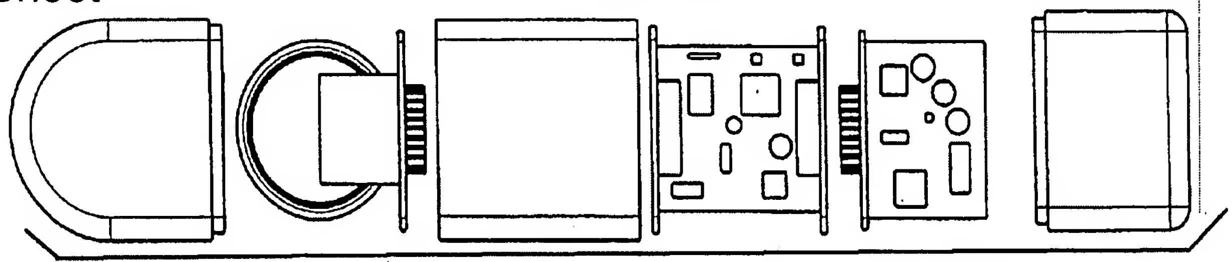


FIG. 2-43A

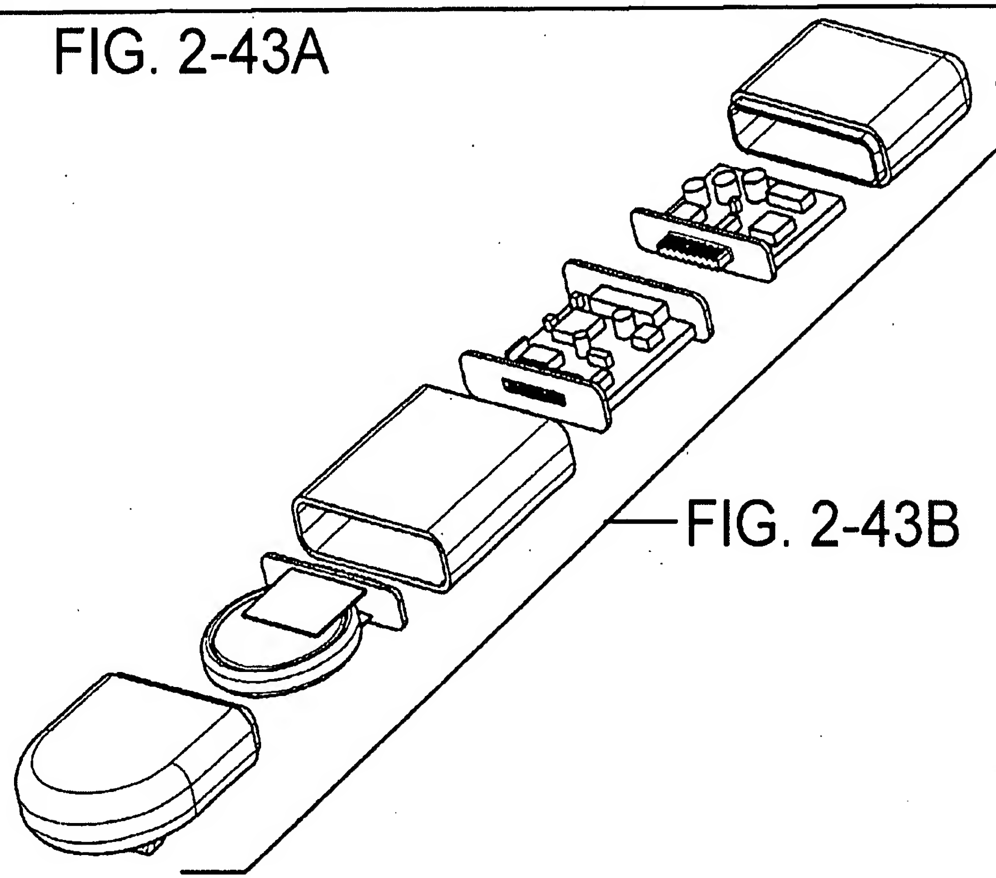


FIG. 2-43B

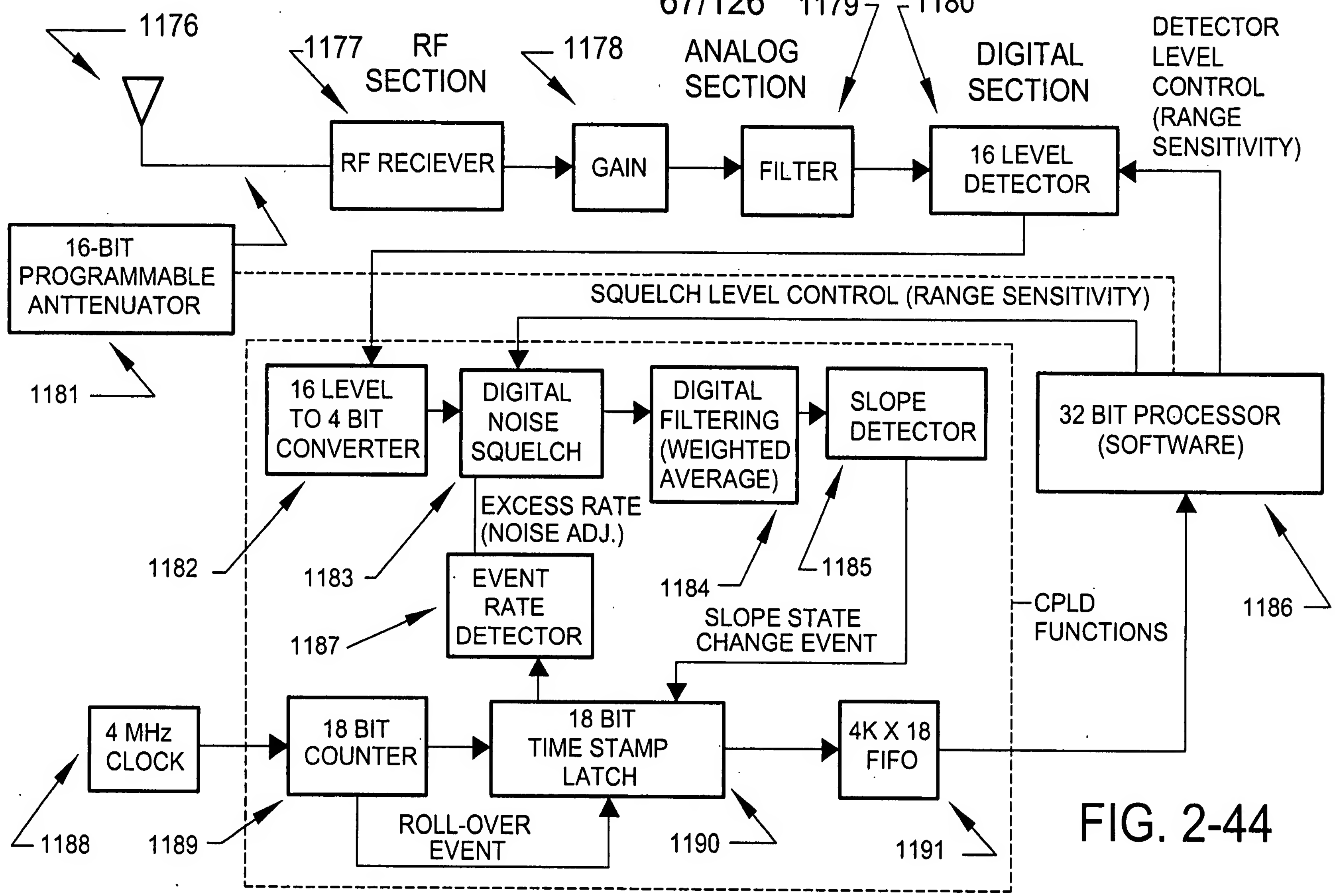

1176
1177
RF SECTION
1178
ANALOG SECTION
1179
1180
DIGITAL SECTION
DETECTOR LEVEL CONTROL (RANGE SENSITIVITY)
RF RECIEVER
GAIN
FILTER
16 LEVEL DETECTOR
16-BIT PROGRAMMABLE ANTTENUATOR
SQUELCH LEVEL CONTROL (RANGE SENSITIVITY)
1181
16 LEVEL TO 4 BIT CONVERTER
DIGITAL NOISE SQUELCH
DIGITAL FILTERING (WEIGHTED AVERAGE)
SLOPE DETECTOR
32 BIT PROCESSOR (SOFTWARE)
EXCESS RATE (NOISE ADJ.)
1182
1183
1184
1185
EVENT RATE DETECTOR
SLOPE STATE CHANGE EVENT
CPLD FUNCTIONS
1186
1187
4 MHz CLOCK
18 BIT COUNTER
18 BIT TIME STAMP LATCH
4K X 18 FIFO
ROLL-OVER EVENT
1188
1189
1190
1191

FIG. 2-44

RF SECTION RF RECEIVER SECTION

THE RF RECEIVER CONSISTS OF A CONNECTOR FOR THE ANTENNA, AN ANTENNA-RECEIVER IMPEDANCE MATCHING CIRCUIT AND A 00K/ASK RECEIVER. THERE ARE TWO IDENTICAL RF SECTIONS PER CIRCUIT.

**ANALOG SECTION **

GAIN SECTION

THE GAIN SECTION CONSISTS OF A DIFFERENTIAL AMP AND A SUMMING AMP. THE DIFFERENTIAL AMP PROVIDES GAIN AND OFFSET ADJUSTMENT. THE SUMMING AMP ADDS THE TWO (L PER RECEIVER) SIGNALS TOGETHER.

FILTER SECTION

THE FILTER SECTION CONSISTS OF AN ACTIVE FILTER. THE ACTIVE FILTER REDUCES SIGNAL NOISE.

16 LEVEL DETECTOR

THE LEVEL DETECTOR CONSISTS OF A 16 LEVEL VOLTAGE DIVIDER, 16 COMPARATORS AND A UPPER AND LOWER LEVEL VOLTAGE ADJUSTMENT.
THE VOLTAGE DIVIDER PROVIDES 16 EQUALLY SPACED VOLTAGE REFERENCE LEVELS FOR THE 16 COMPARATORS. EACH COMPARATORS DETECTS IF THE RECEIVED SIGNAL IS HIGH OR LOWER THAN ITS VOLTAGE REFERENCE. THE UPPER AND LOWER VOLTAGE REFERENCES ARE ADJUSTED USING A POTENTIOMETER.

** CPLD SECTION**

16 LEVEL TO 4 BIT CONVERTERS

THE 16 LEVEL TO 4 BIT CONVERTER DEBOUNCES THE INCOMING BITS AND CONVERTS THE DATA TO A 4 BIT BINARY CODE.

DIGITAL SQUELCH

THE DIGITAL SQUELCH IS A FUNCTION USED TO SET A MINIMUM SIGNAL VALUE. ANY SIGNALS BELOW THE DIGITAL SQUELCH LEVEL ARE IGNORED.

DIGITAL FILTERING

FIG. 2-44a

HARDWARE_BLOCK_DESC

THE DIGITAL FILTER PERFORMS A WEIGHTED AVERAGE ON THE SIGNAL. EACH SAMPLE IS WEIGHTED BASED ON THE AGE OF THE SAMPLE. THE OLDER THE SAMPLE THE LESS WEIGHT A SAMPLE HAS IN THE AVERAGE. THIS SMOOTHES THE SIGNAL AND REDUCES NOISE.

SLOPE DETECTOR
THE SLOPE DETECTOR LOOKS FOR SLOPE CHANGES IN THE SIGNAL. THERE ARE CURRENTLY 3 TYPES OF SLOPES DETECTED (UP, DOWN & LEVEL) ANY CHANGE IN SLOPE TYPE IS DETECTED AND A PULSE IS SENT.

18 BIT COUNTER
AN 18 BIT COUNTER IS USED TO KEEP A ROLLING COUNT OF THE 4MHz CLOCK IN A BINARY FORMAT.

TIME STAMP LATCH
A TIME STAMP IS LATCHED WHENEVER A PULSE IS LATCHED FROM THE 18 BIT COUNTER WHENEVER A PULSE IS RECEIVED FROM THE SLOPE DETECTOR. ALL ROLL-OVER EVENTS ARE ALSO LATCH TO AID IN TRACKING EVENT TIMING.

4K X 18 BIT FIFO
ALL DATA CAPTURED IN THE TIME STAMP LATCH IS ALSO LOADED IN THE FIFO (FIRST IN FIRST OUT) MEMORY DEVICE. THE FIFO IS USED TO STORE TIME STAMPS UNTIL THE MICRO-PROCESSOR IS READY TO READ IT.

EVENT RATE DETECTOR
WHEN TIME STAMPS OCCUR AT A RATE THAT IS FASTER THAN THE KNOWN SIGNAL RATE THE EVENT RATE DETECTOR MAKES AN AUTOMATIC ADJUSTMENT TO THE DIGITAL SQUELCH CIRCUIT. THIS EFFECTIVELY ELIMINATES FAST NOISE SIGNALS.

MICRO PROCESSOR
THE MICROPROCESSOR READS DATA FROM THE FIFO AND ANALYZES THE TIME STAMPS TO DECODE DATA FROM THE TRANSMITTER. THE MICROPROCESSOR ALSO CONTROLS THE POTENTIOMETERS THAT ADJUST THE UPPER AND LOWER THRESHOLD LEVELS. THE MICRO PROCESSOR SETS THE LEVEL IN THE DIGITAL SQUELCH CIRCUIT.

FIG. 2-44b

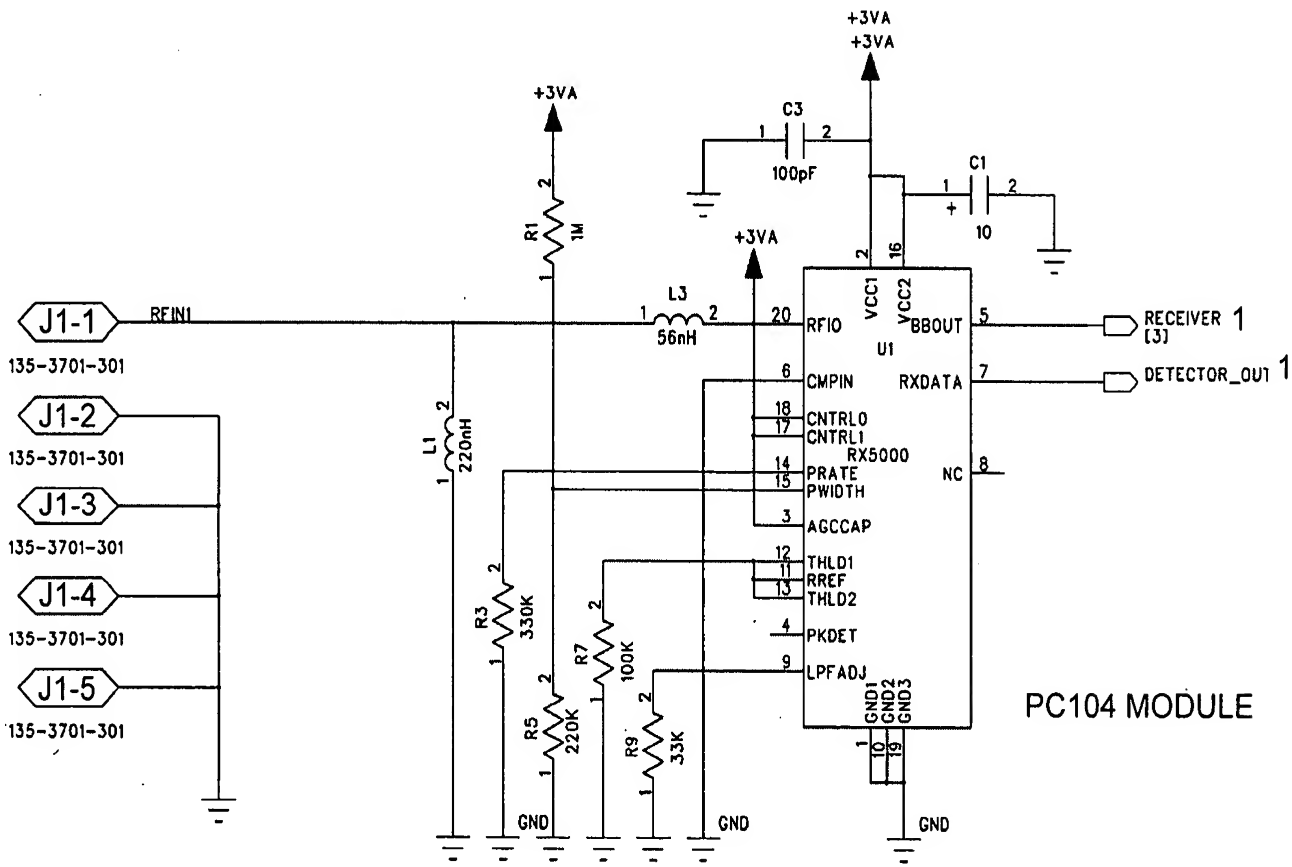

J1-1
135-3701-301
J1-2
135-3701-301
J1-3
135-3701-301
J1-4
135-3701-301
J1-5
135-3701-301
RFIN1
+3VA
R1
1M
L1
220nH
R3
330K
R5
220K
R7
100K
R9
33K
GND
L3
56nH
C3
100pF
C1
10
U1
RX5000
RFIO
CMPIN
CNTRL0
CNTRL1
PRATE
PWIDTH
AGCCAP
THLD1
RREF
THLD2
PKDET
LPFADJ
VCC1
VCC2
BBOUT
RXDATA
NC
GND1
GND2
GND3
RECEIVER 1
[3]
DETECTOR_OUT 1
PC104 MODULE

FIG. 2-45

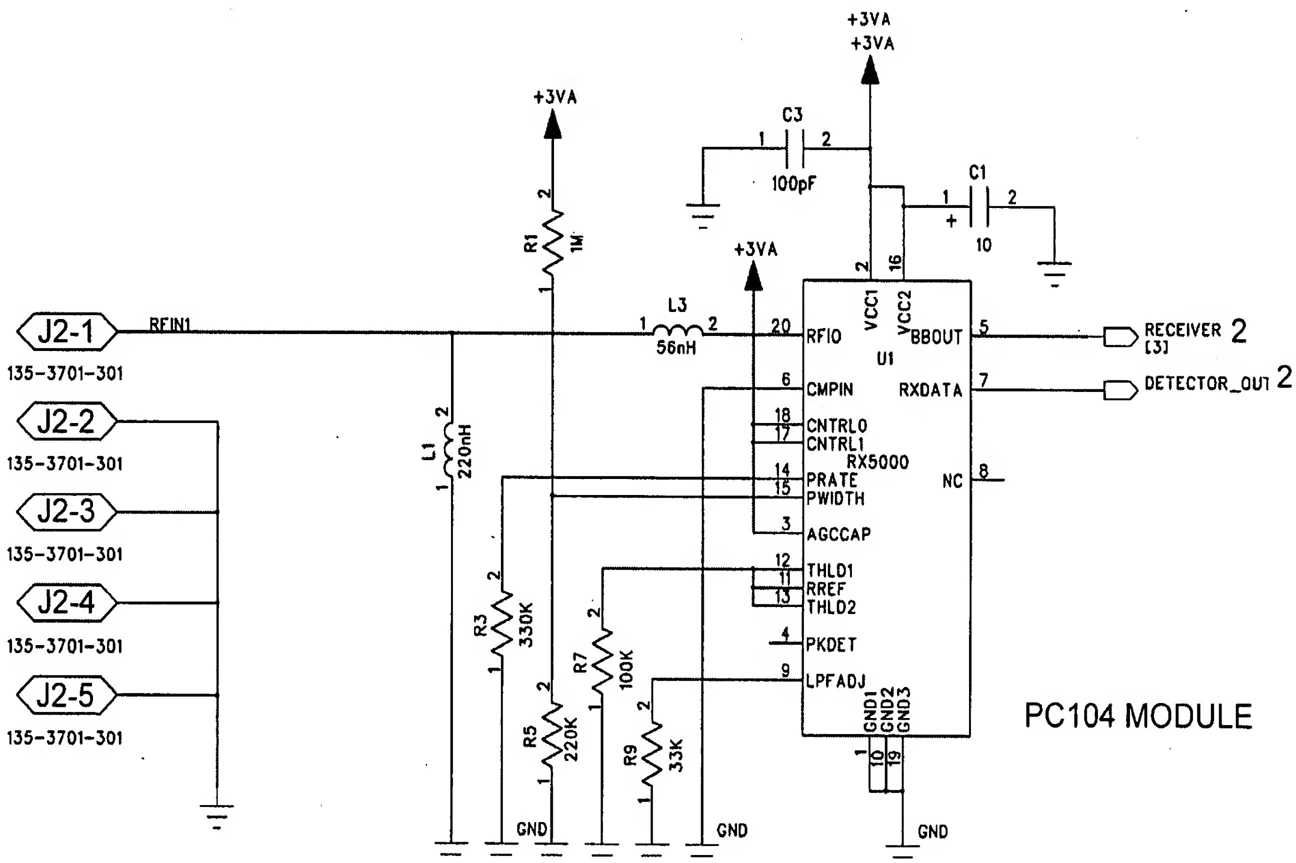

J2-1
135-3701-301
J2-2
135-3701-301
J2-3
135-3701-301
J2-4
135-3701-301
J2-5
135-3701-301
RFIN1
L1
220nH
R1
1M
+3VA
R3
330K
R5
220K
R7
100K
R9
33K
GND
L3
56nH
C3
100pF
C1
10
+3VA
+3VA
+3VA
U1
RX5000
RFIO
CMPIN
CNTRL0
CNTRL1
PRATE
PWIDTH
AGCCAP
THLD1
RREF
THLD2
PKDET
LPFADJ
VCC1
VCC2
BBOUT
RXDATA
NC
GND1
GND2
GND3
RECEIVER 2
[3]
DETECTOR_OUT 2
PC104 MODULE

FIG. 2-46

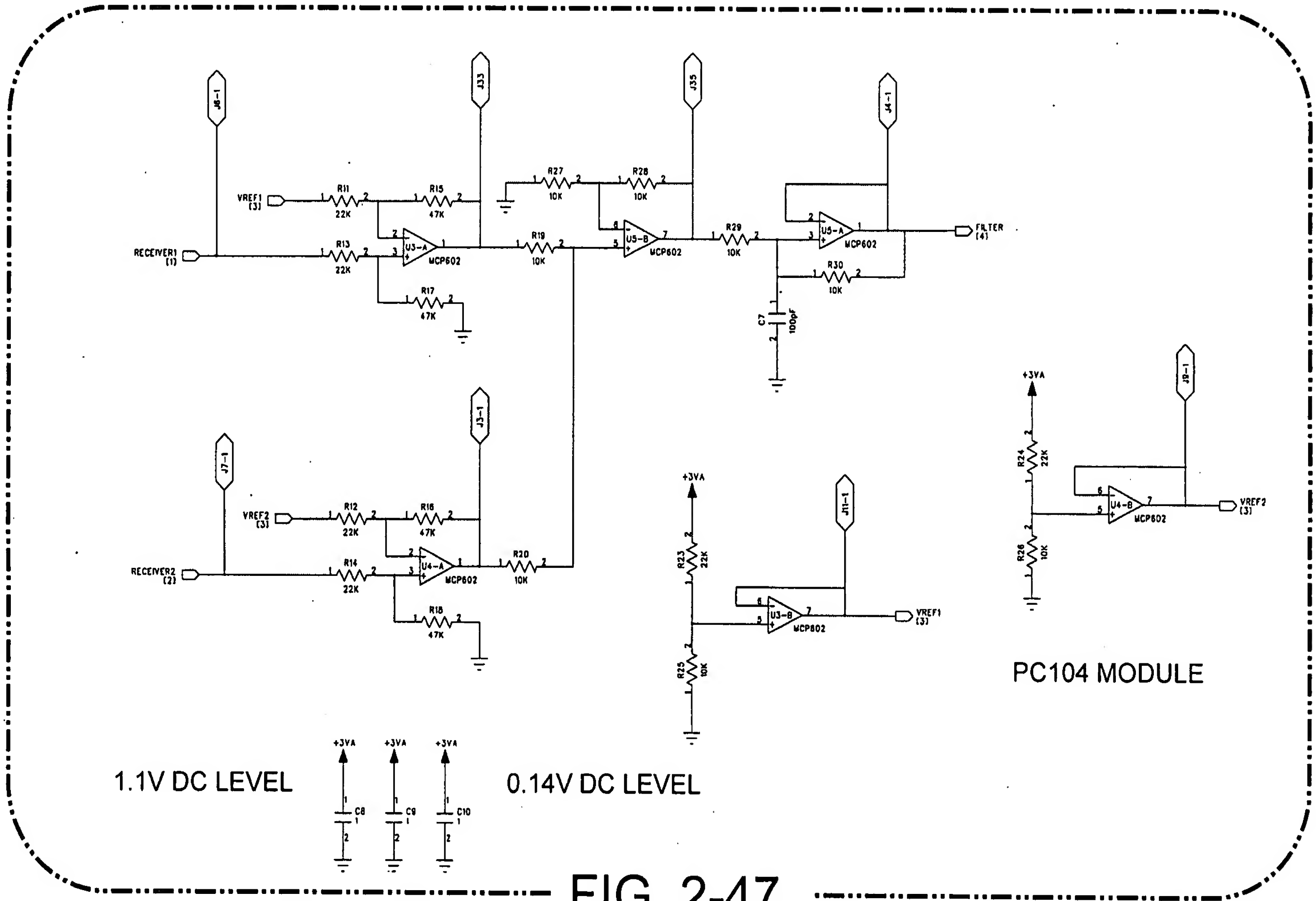

J6-1
J33
J35
J4-1
VREF1
(3)
RECEIVER1
(1)
R11
22K
R13
22K
R15
47K
R17
47K
U3-A
MCP602
R19
10K
R27
10K
R28
10K
U5-B
MCP602
R29
10K
U5-A
MCP602
R30
10K
C7
100pF
FILTER
(4)
J7-1
J3-1
VREF2
(3)
RECEIVER2
(2)
R12
22K
R14
22K
R16
47K
R18
47K
U4-A
MCP602
R20
10K
+3VA
R23
22K
R25
10K
U3-B
MCP602
J11-1
VREF1
(3)
+3VA
R24
22K
R26
10K
U4-B
MCP602
J8-1
VREF2
(3)
PC104 MODULE
1.1V DC LEVEL
+3VA
C8
C9
C10
0.14V DC LEVEL

FIG. 2-47

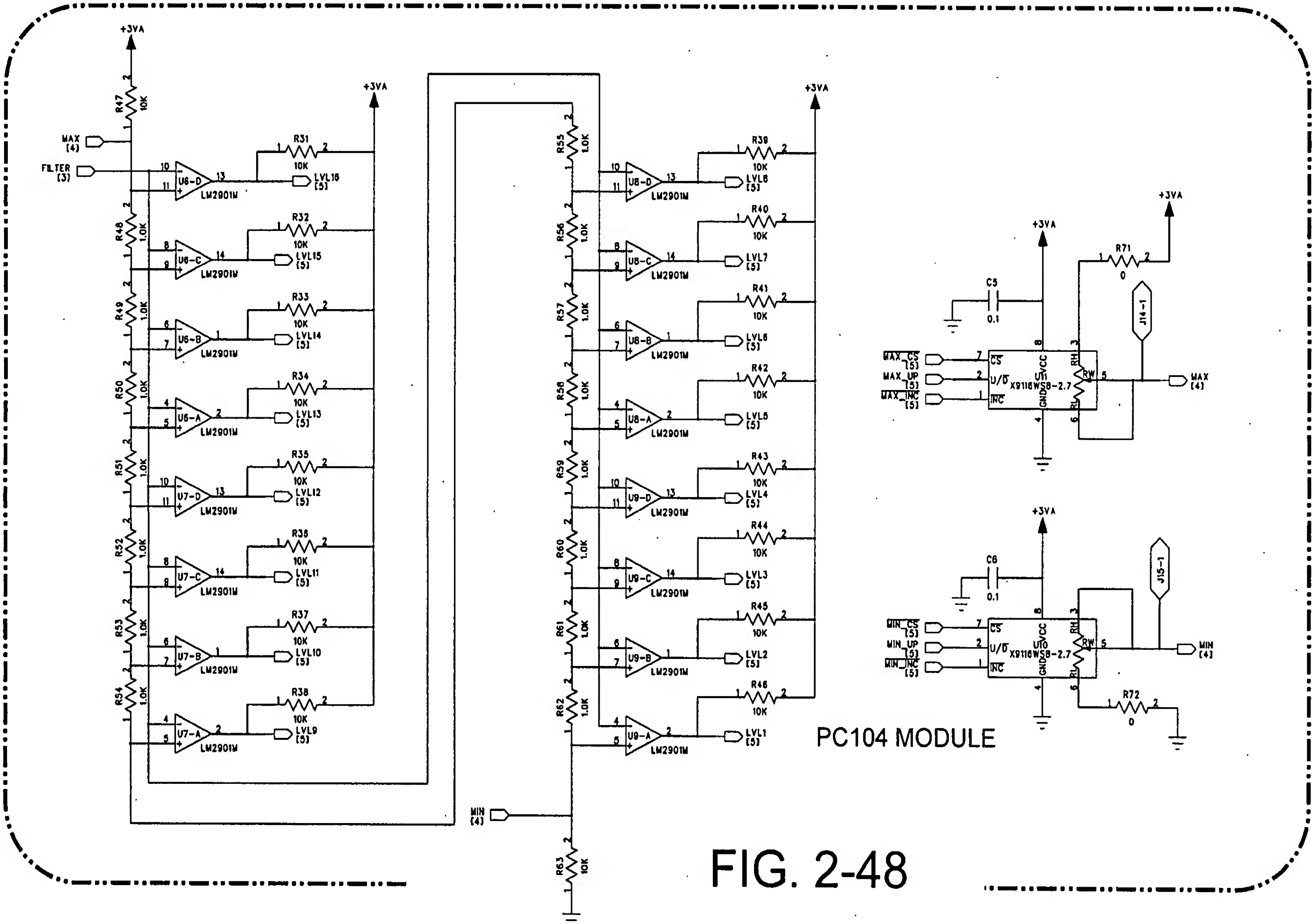
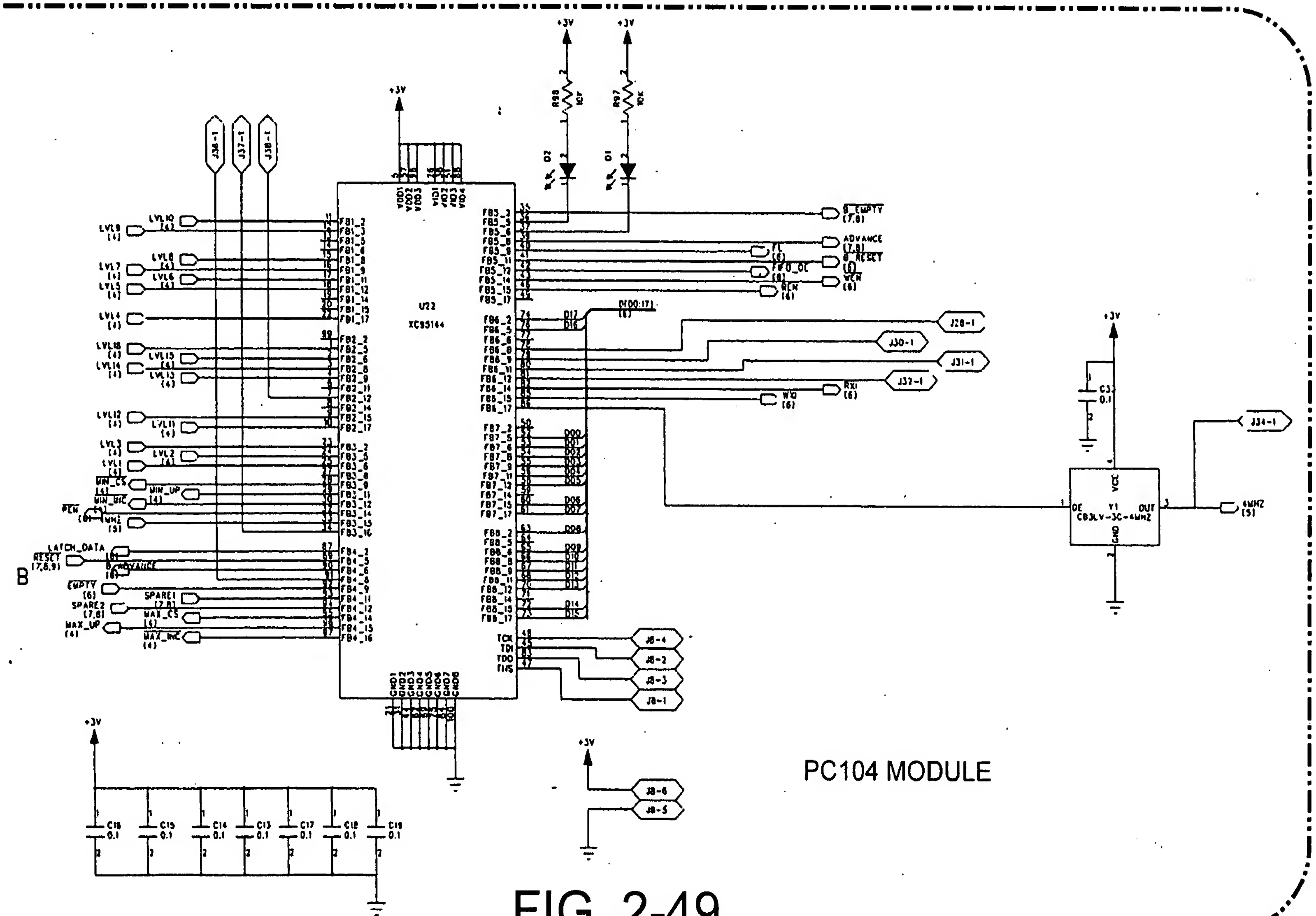

+3VA
R47
10K
MAX
[4]
FILTER
[3]
U6-D
LM2901M
R31
10K
LVL16
[5]
R48
1.0K
U6-C
R32
LVL15
R49
U6-B
R33
LVL14
R50
U6-A
R34
LVL13
R51
U7-D
R35
LVL12
R52
U7-C
R36
LVL11
R53
U7-B
R37
LVL10
R54
U7-A
R38
LVL9
R55
U8-D
R39
LVL8
R56
U8-C
R40
LVL7
R57
U8-B
R41
LVL6
R58
U8-A
R42
LVL5
R59
U9-D
R43
LVL4
R60
U9-C
R44
LVL3
R61
U9-B
R45
LVL2
R62
U9-A
R46
LVL1
MIN
[4]
R63
C5
0.1
R71
0
J14-1
MAX_CS
MAX_UP
MAX_INC
U11
X9116WS8-2.7
VCC
GND
RH
RW
RL
C6
J15-1
MIN_CS
MIN_UP
MIN_INC
U10
R72
PC104 MODULE

FIG. 2-48



PC104 MODULE

FIG. 2-49

Replacement Sheet

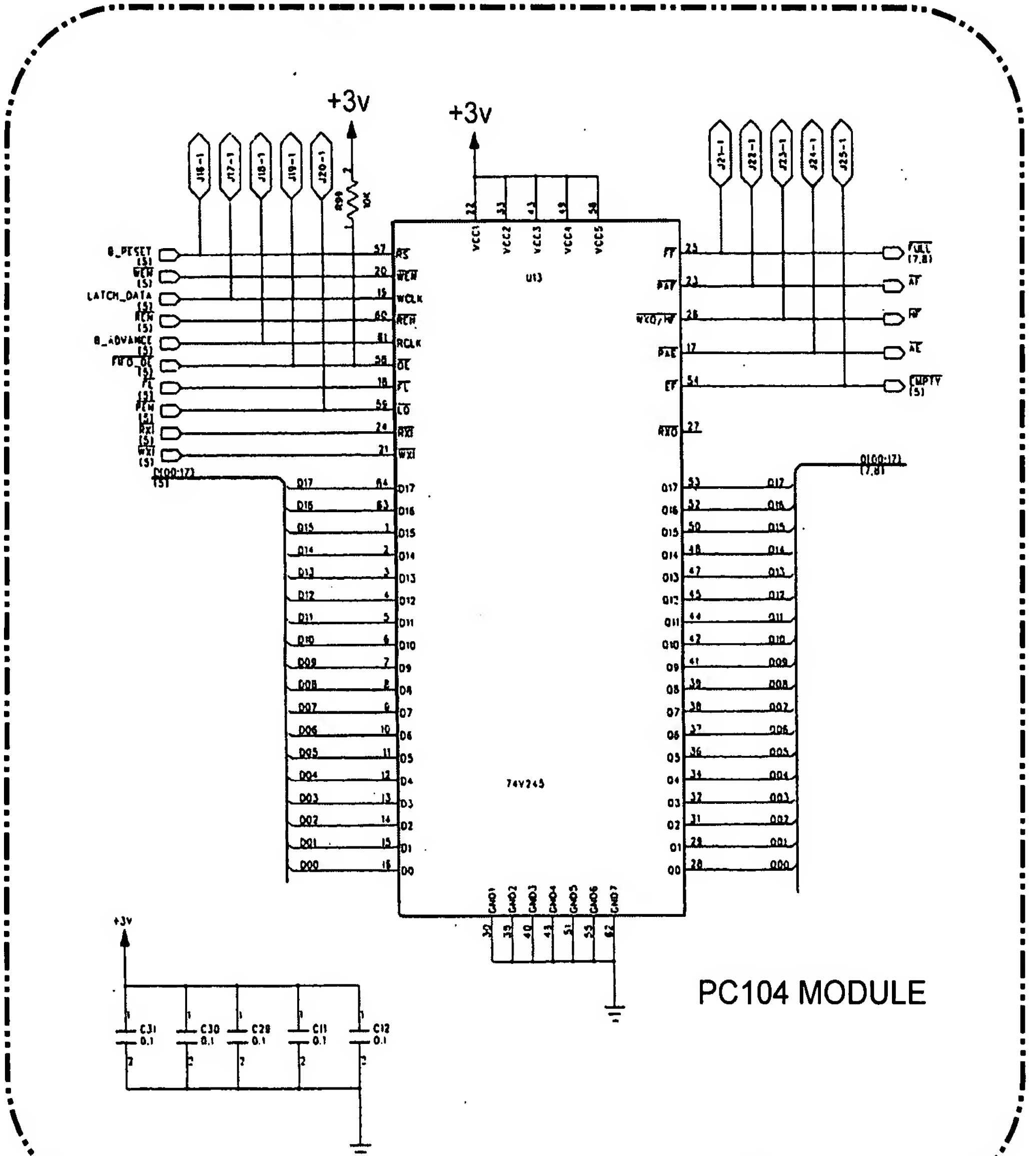


FIG 2-50

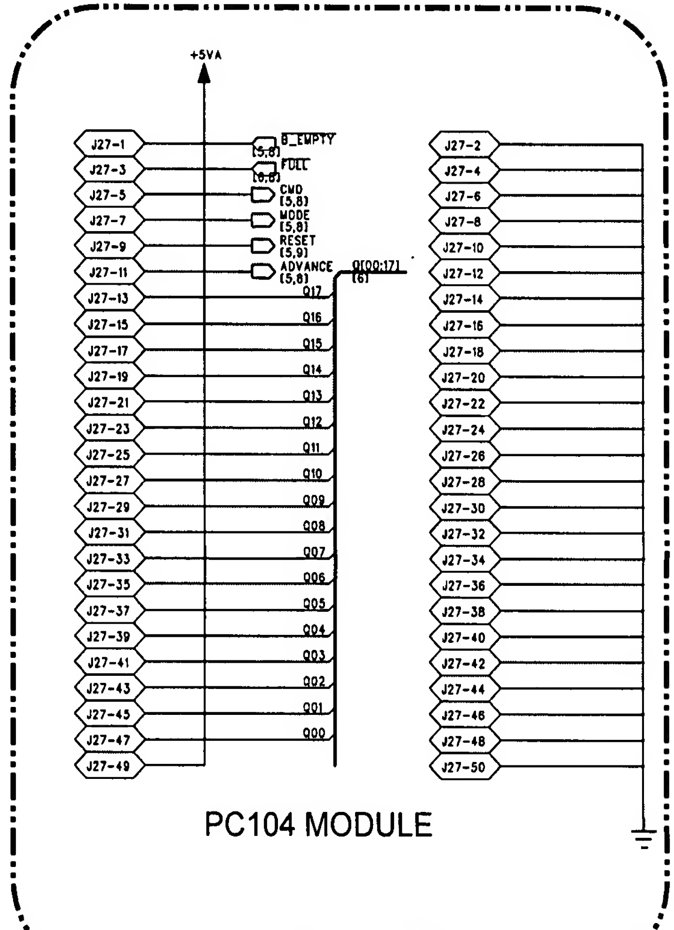


FIG 2-51

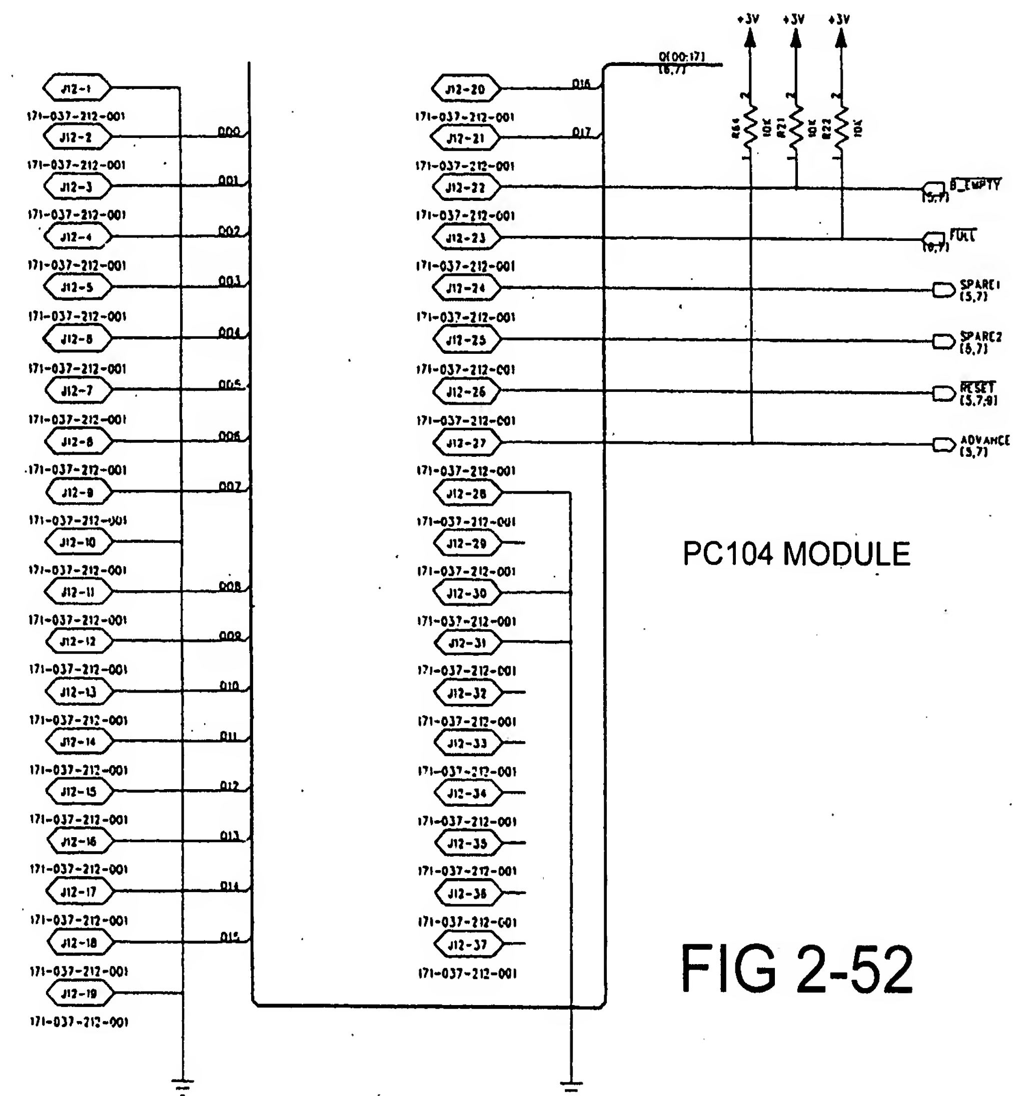

PC104 MODULE
+3V
R64
R21
R22
10K
B_EMPTY
FULL
SPARE1
SPARE2
RESET
ADVANCE
D[00:17]
171-037-212-001

FIG 2-52

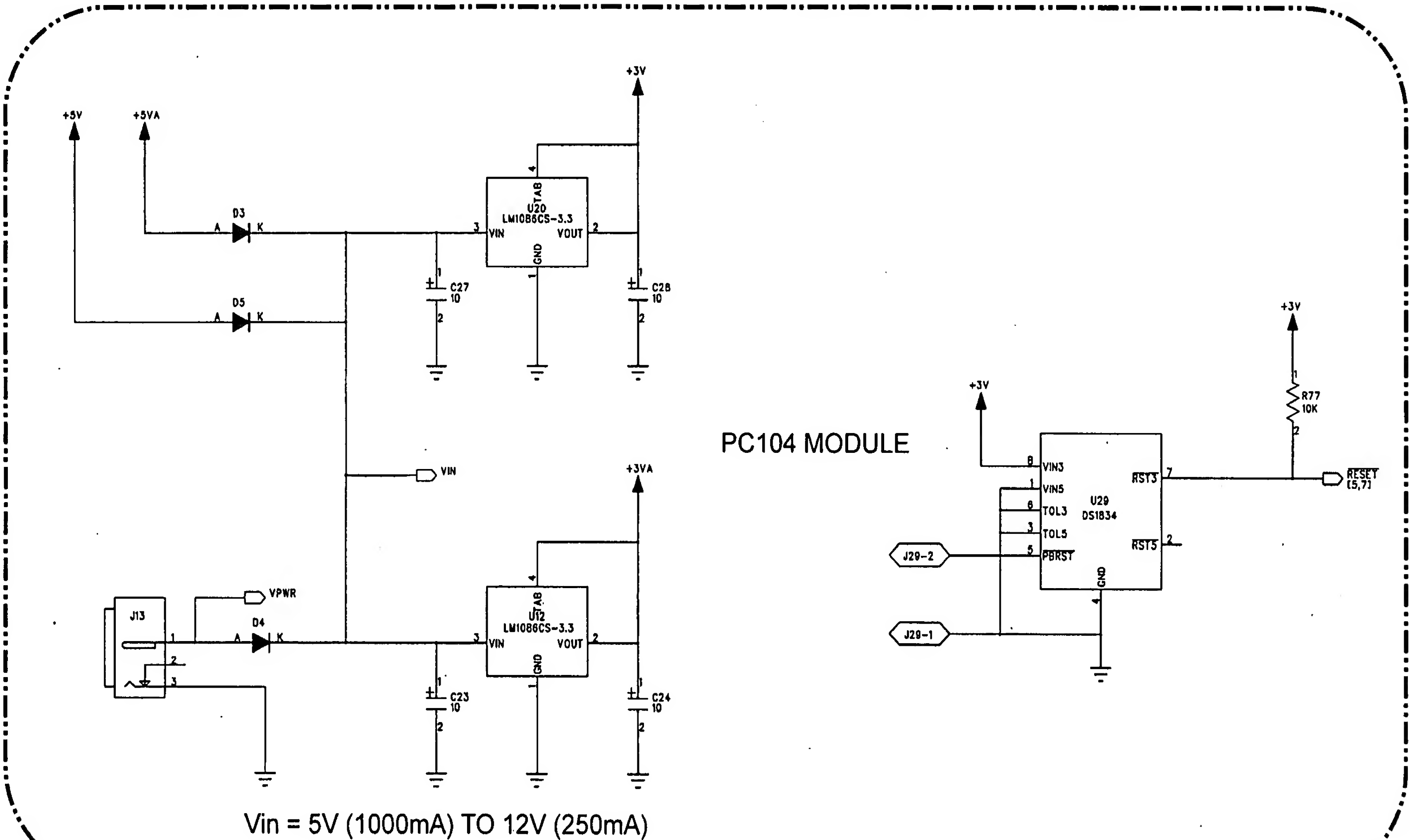

+5V
+5VA
D3
A
K
D5
A
K
+3V
U20
LM1086CS-3.3
TAB
VIN
VOUT
GND
C27
10
C28
10
VIN
+3VA
U12
LM1086CS-3.3
TAB
VIN
VOUT
GND
C23
10
C24
10
J13
VPWR
D4
A
K
PC104 MODULE
+3V
+3V
R77
10K
U29
DS1834
VIN3
VIN5
TOL3
TOL5
PBRST
RST3
RST5
GND
RESET
(5,7)
J29-2
J29-1
Vin = 5V (1000mA) TO 12V (250mA)

FIG 2-53

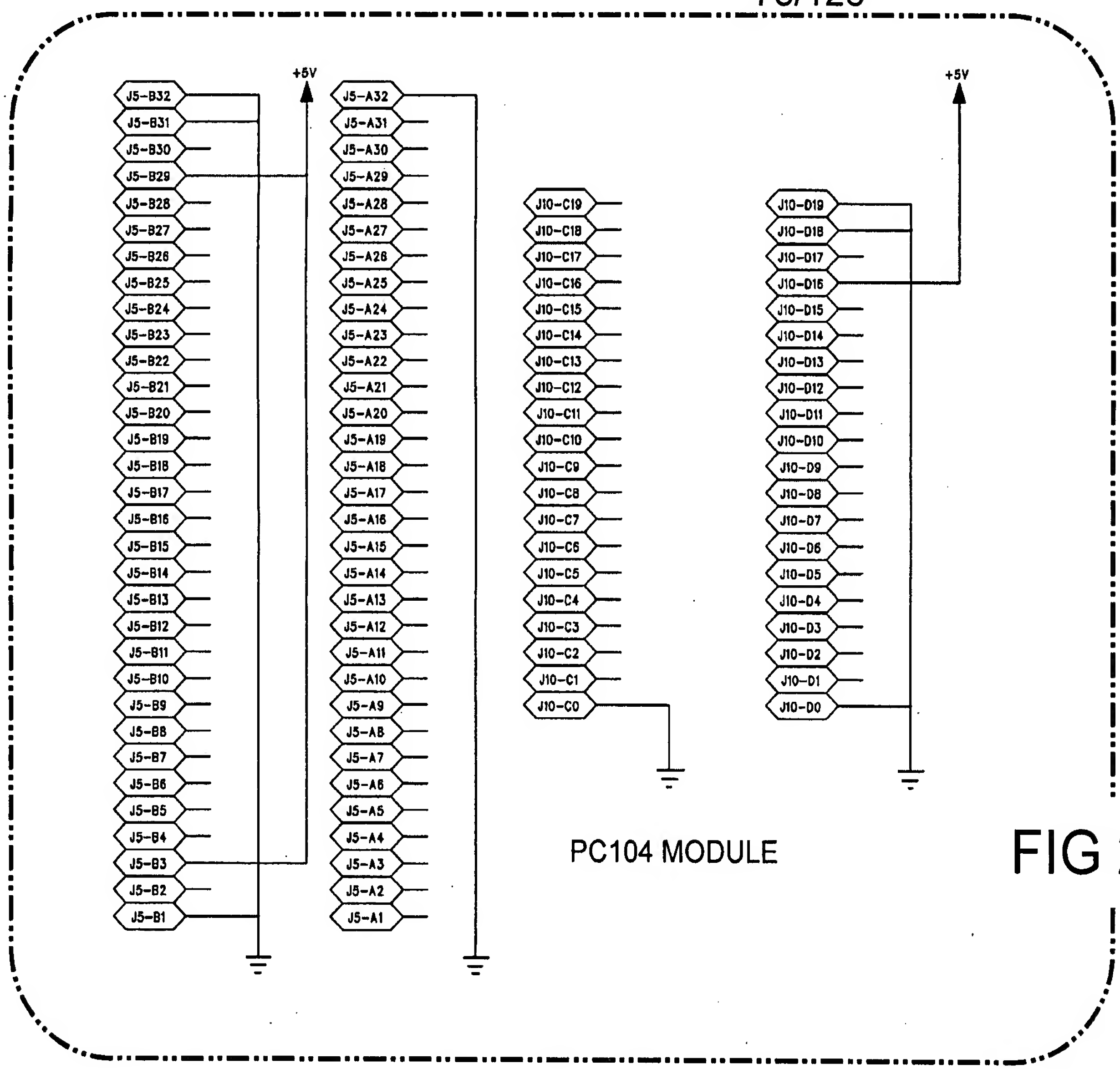

+5V
J5-B32
J5-B31
J5-B30
J5-B29
J5-B28
J5-B27
J5-B26
J5-B25
J5-B24
J5-B23
J5-B22
J5-B21
J5-B20
J5-B19
J5-B18
J5-B17
J5-B16
J5-B15
J5-B14
J5-B13
J5-B12
J5-B11
J5-B10
J5-B9
J5-B8
J5-B7
J5-B6
J5-B5
J5-B4
J5-B3
J5-B2
J5-B1
J5-A32
J5-A31
J5-A30
J5-A29
J5-A28
J5-A27
J5-A26
J5-A25
J5-A24
J5-A23
J5-A22
J5-A21
J5-A20
J5-A19
J5-A18
J5-A17
J5-A16
J5-A15
J5-A14
J5-A13
J5-A12
J5-A11
J5-A10
J5-A9
J5-A8
J5-A7
J5-A6
J5-A5
J5-A4
J5-A3
J5-A2
J5-A1
J10-C19
J10-C18
J10-C17
J10-C16
J10-C15
J10-C14
J10-C13
J10-C12
J10-C11
J10-C10
J10-C9
J10-C8
J10-C7
J10-C6
J10-C5
J10-C4
J10-C3
J10-C2
J10-C1
J10-C0
+5V
J10-D19
J10-D18
J10-D17
J10-D16
J10-D15
J10-D14
J10-D13
J10-D12
J10-D11
J10-D10
J10-D9
J10-D8
J10-D7
J10-D6
J10-D5
J10-D4
J10-D3
J10-D2
J10-D1
J10-D0
PC104 MODULE

FIG 2-54

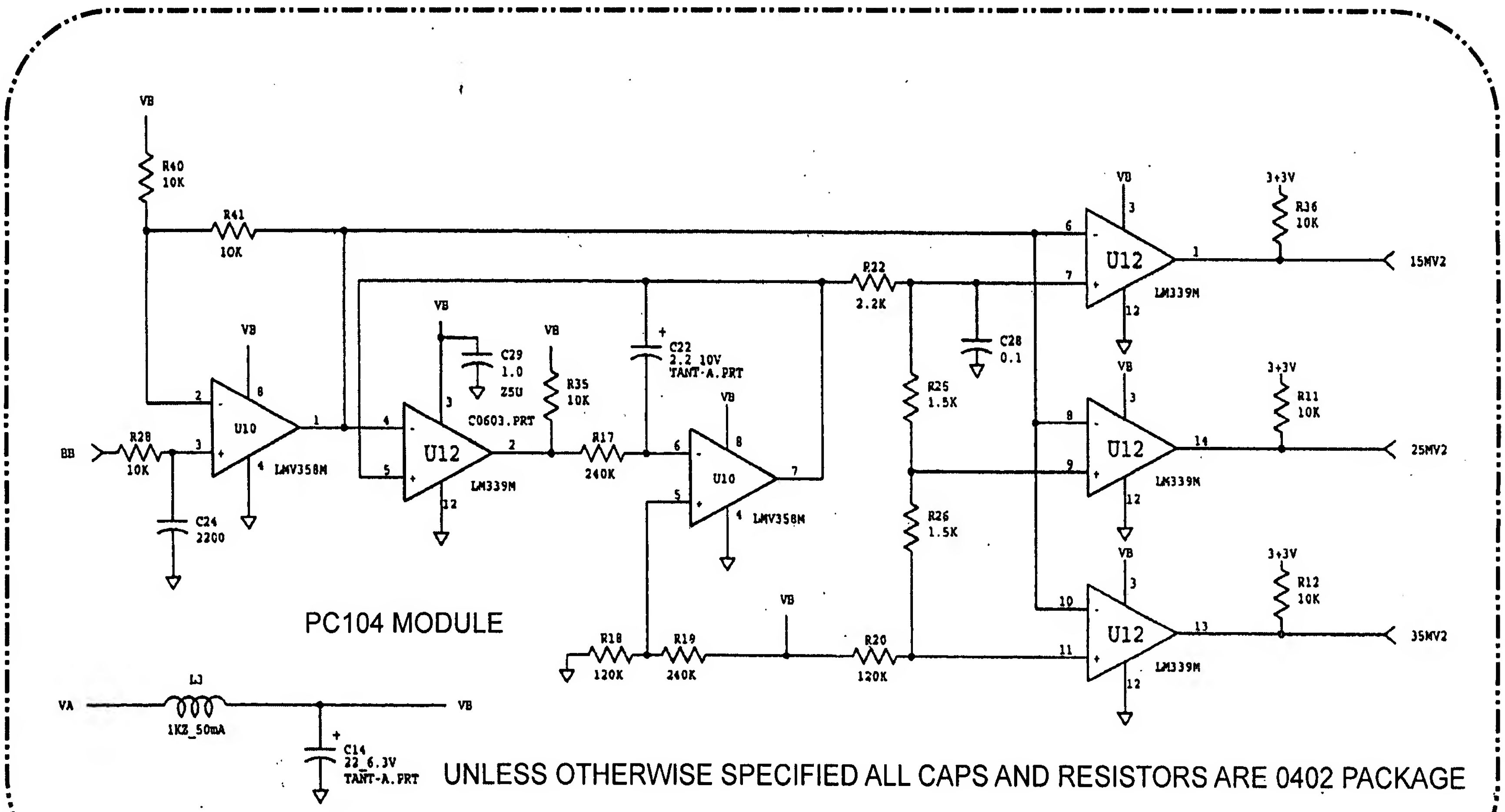

VB
R40
10K
R41
10K
BB
R28
10K
C24
2200
U10
LMV358M
U12
LM339M
VB
C29
1.0
Z5U
C0603.PRT
R35
10K
R17
240K
C22
2.2 10V
TANT-A.PRT
LMV358M
R22
2.2K
C28
0.1
R25
1.5K
R26
1.5K
R18
120K
R19
240K
R20
120K
3+3V
R36
10K
R11
10K
R12
10K
15MV2
25MV2
35MV2
PC104 MODULE
VA
L3
1K2_50mA
C14
22_6.3V
TANT-A.PRT
UNLESS OTHERWISE SPECIFIED ALL CAPS AND RESISTORS ARE 0402 PACKAGE

FIG 2-55

Replacement Sheet

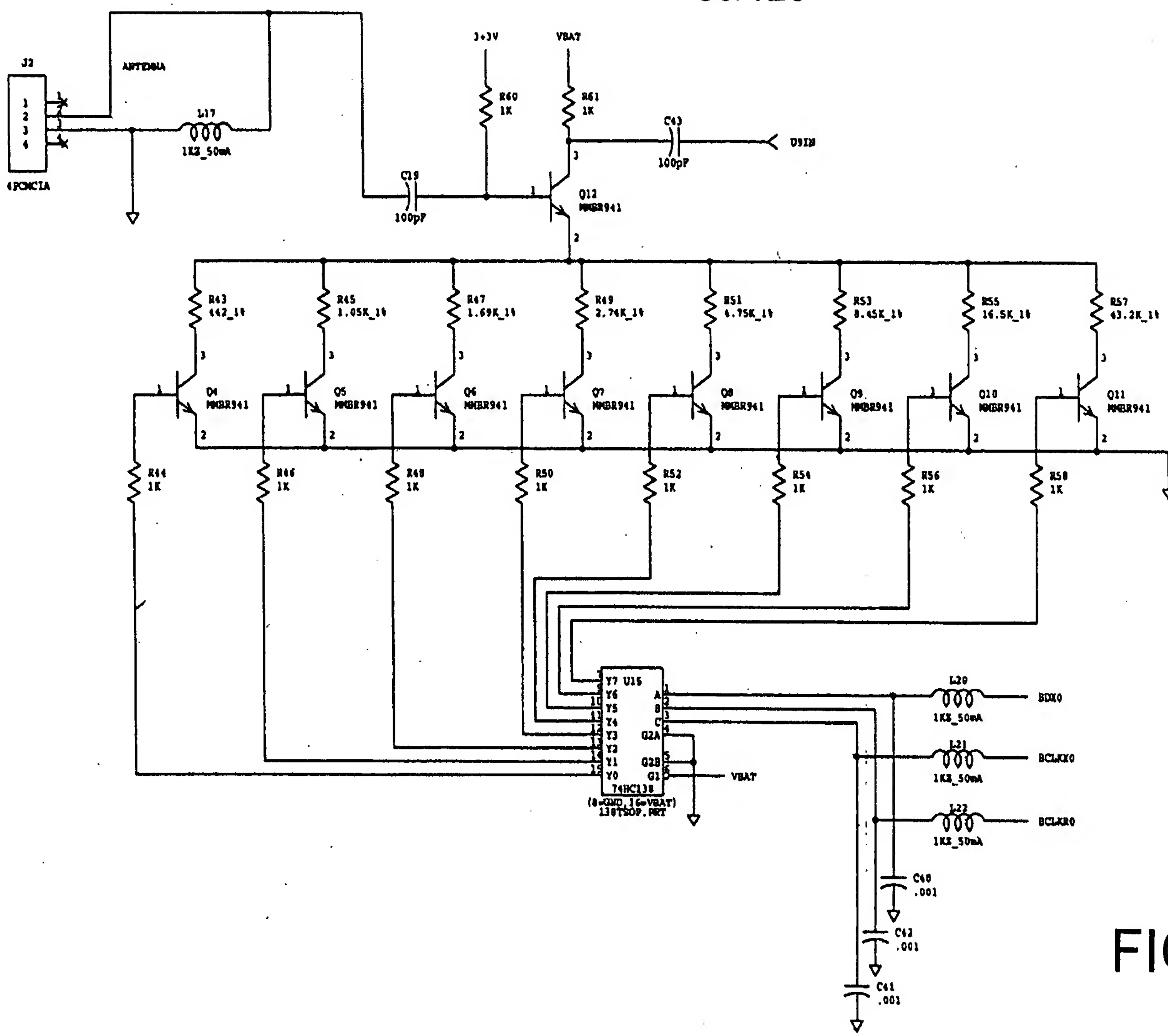


FIG 2-56

Replacement Sheet

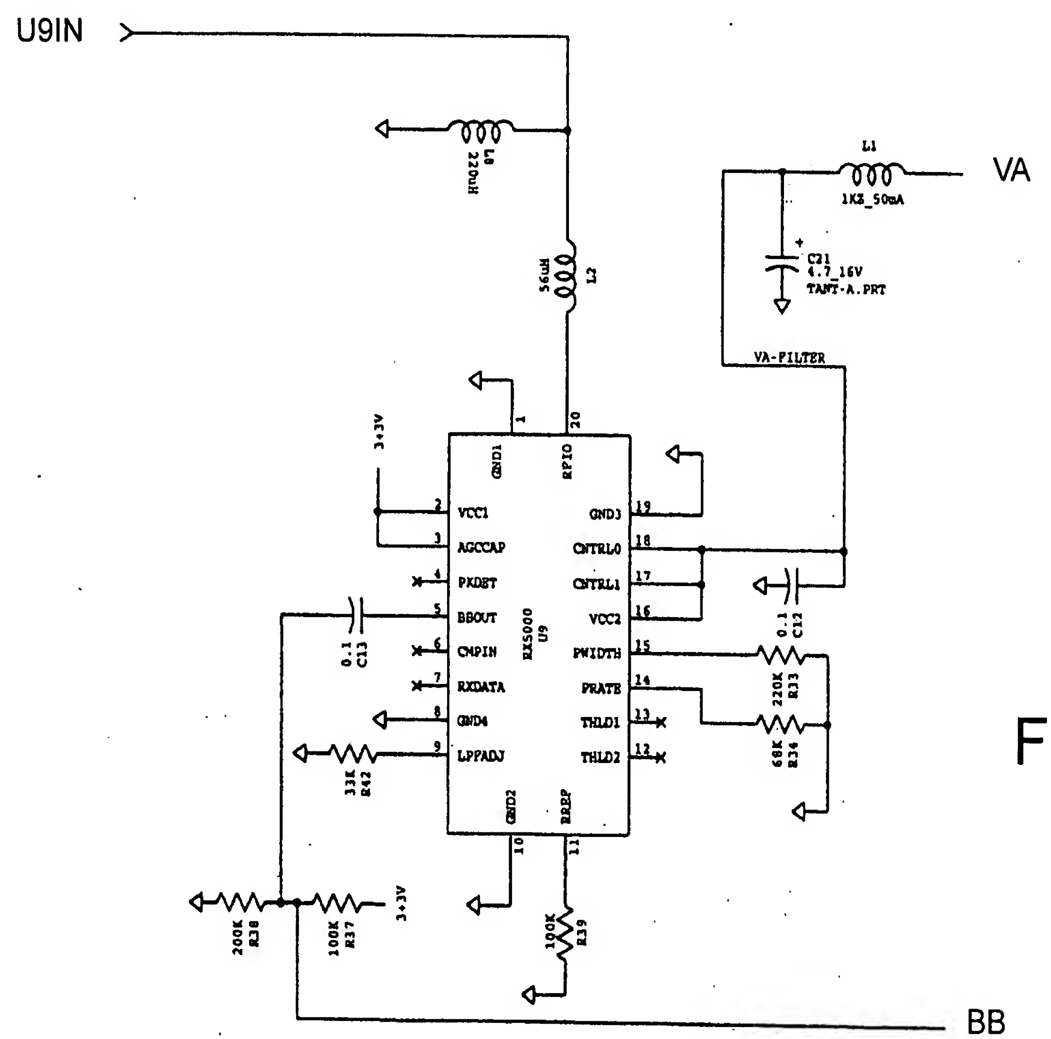


FIG 2-57

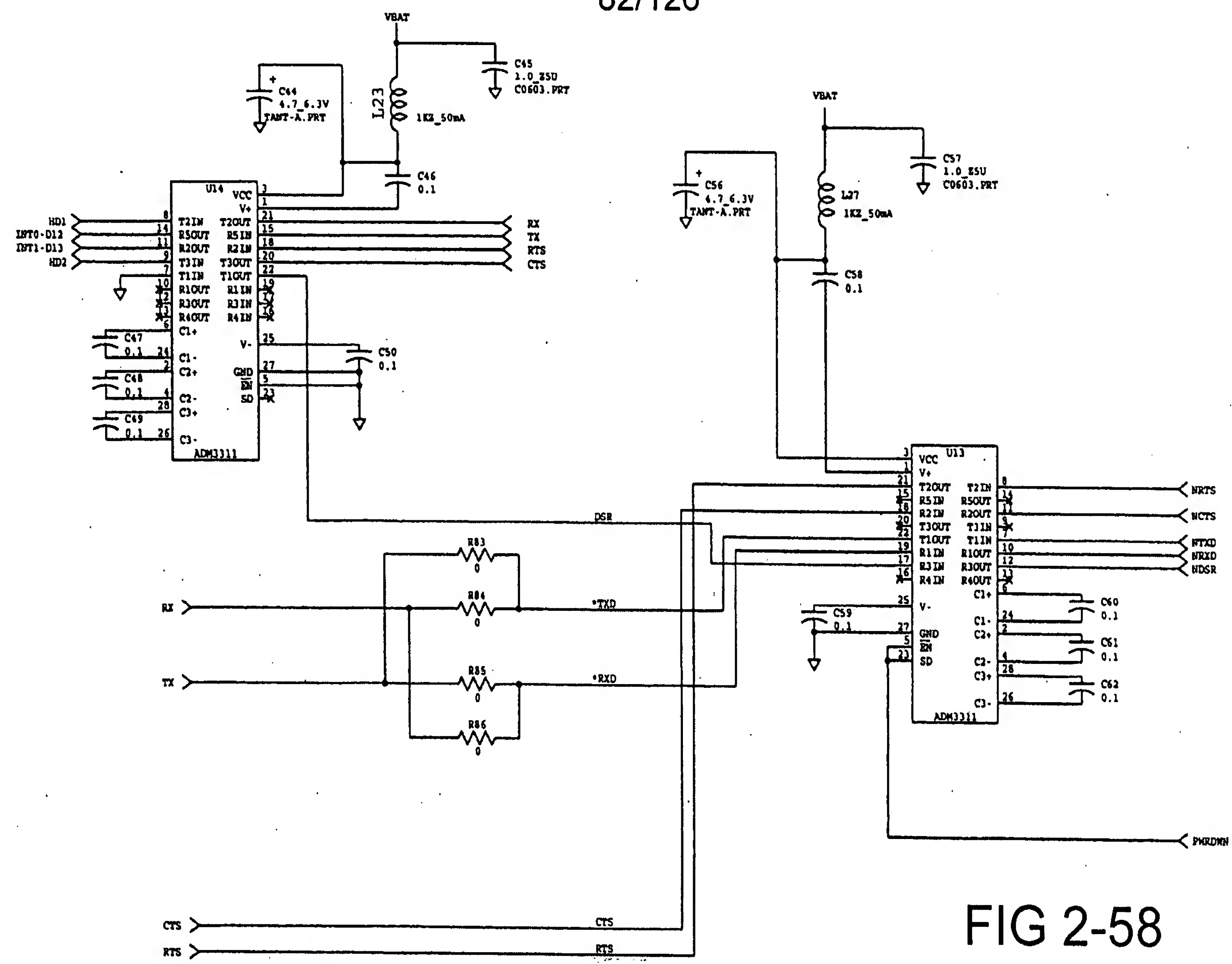

VBAT
C45 1.0_Z5U C0603.PRT
C44 4.7_6.3V TANT-A.PRT
L23 1K2_50mA
C46 0.1
U14
ADM3311
HD1
INT0-D12
INT1-D13
HD2
RX
TX
RTS
CTS
C47 0.1
C48 0.1
C49 0.1
C50 0.1
VBAT
C57 1.0_Z5U C0603.PRT
C56 4.7_6.3V TANT-A.PRT
L27 1K2_50mA
C58 0.1
U13
ADM3311
NRTS
NCTS
NTXD
NRXD
NDSR
C59 0.1
C60 0.1
C61 0.1
C62 0.1
PWRDWN
DSR
R83 0
R84 0
R85 0
R86 0
*TXD
*RXD
RX
TX
CTS
RTS

FIG 2-58

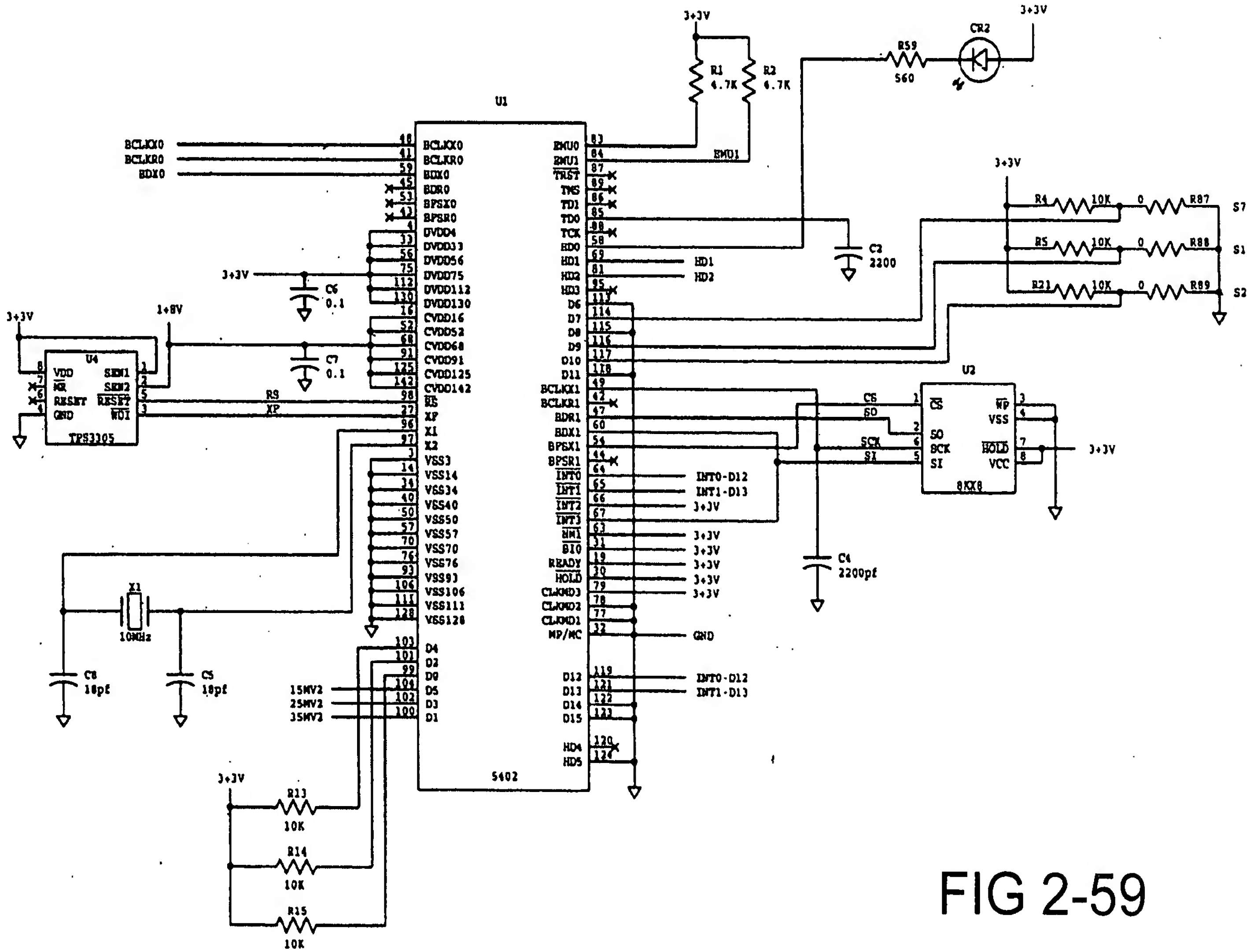

U1
5402
U2
8KX8
U4
TPS3305
CR2
R59
560
R1
4.7K
R2
4.7K
C2
2200
C4
2200pf
C5
10pf
C8
10pf
C6
0.1
C7
0.1
X1
10MHz
R4
R5
R21
10K
R87
R88
R89
0
S7
S1
S2
R13
R14
R15
3+3V
1+8V
GND

FIG 2-59

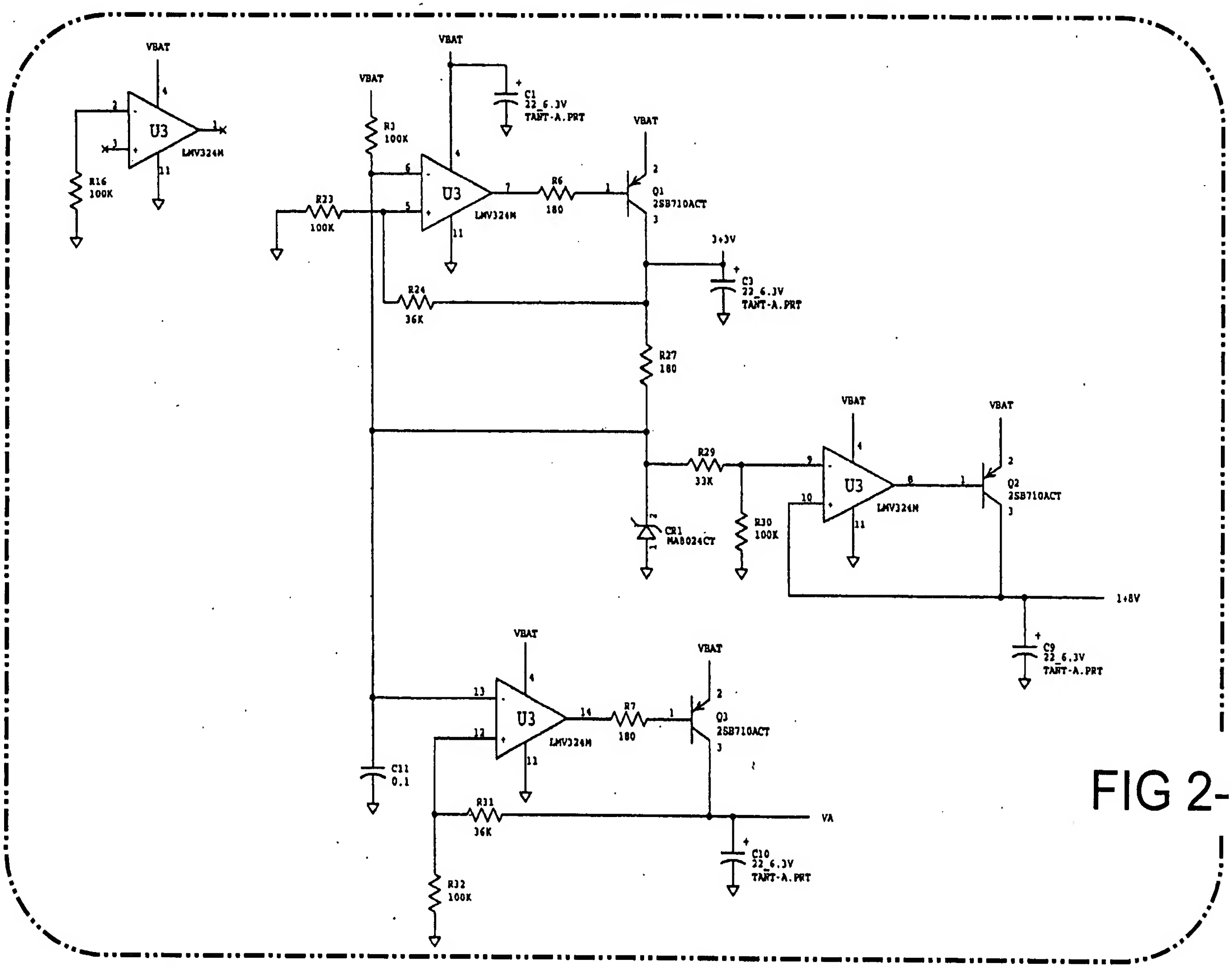

VBAT
U3
LMV324M
R16
100K
R3
100K
R23
100K
C1
22_6.3V
TANT-A.PRT
R6
180
Q1
2SB710ACT
3+3V
C3
22_6.3V
TANT-A.PRT
R24
36K
R27
180
R29
33K
CR1
MA8024CT
R30
100K
Q2
2SB710ACT
1+8V
C9
22_6.3V
TANT-A.PRT
R7
180
Q3
2SB710ACT
C11
0.1
R31
36K
VA
C10
22_6.3V
TANT-A.PRT
R32
100K

FIG 2-60

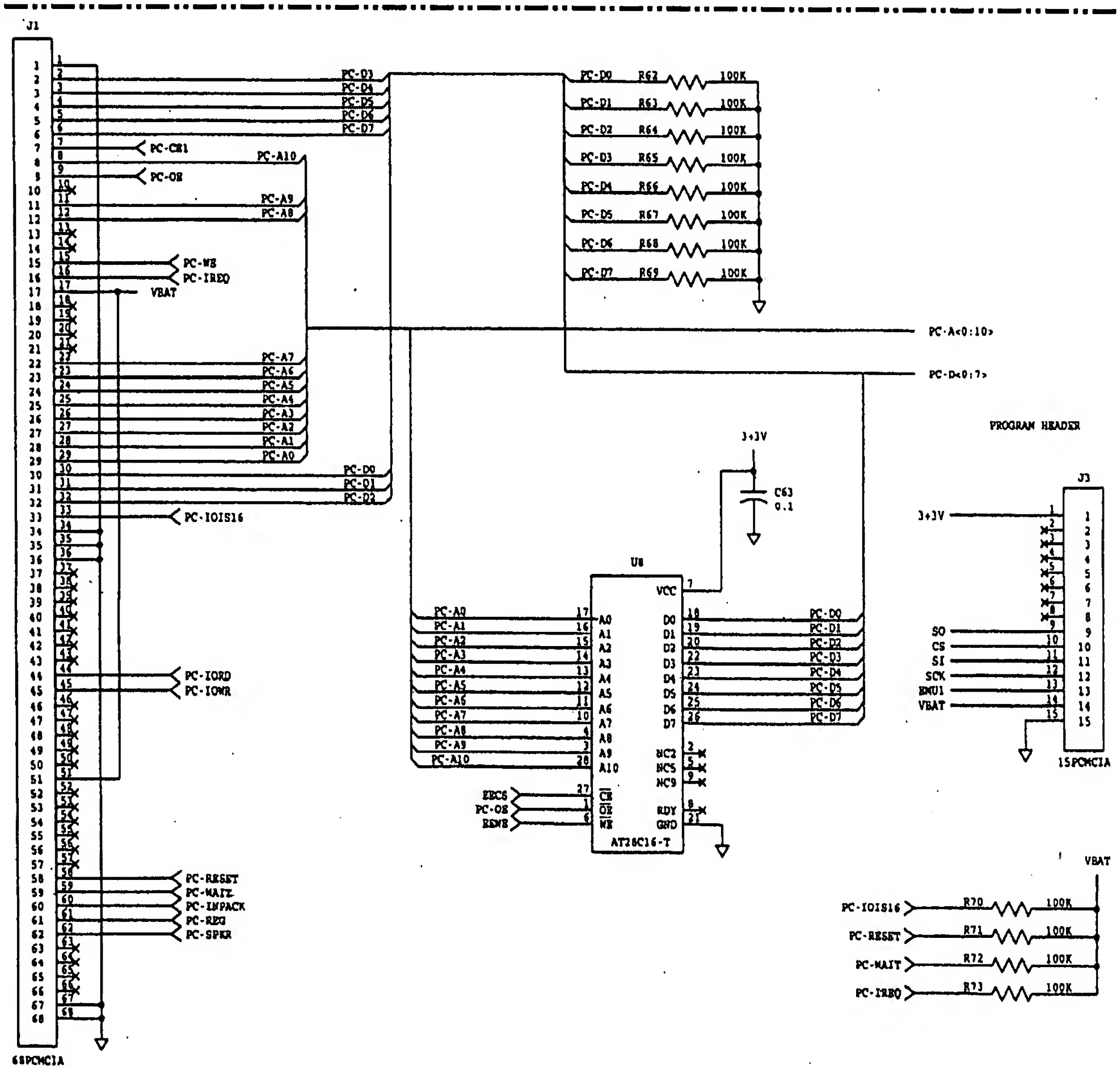

J1
68PCMCIA
PC-CE1
PC-OE
PC-WE
PC-IREQ
VBAT
PC-IOIS16
PC-IORD
PC-IOWR
PC-RESET
PC-WAIT
PC-INPACK
PC-REG
PC-SPKR
PC-A<0:10>
PC-D<0:7>
R62
R63
R64
R65
R66
R67
R68
R69
100K
3+3V
C63
0.1
U8
AT28C16-T
VCC
GND
RDY
EECS
PC-OE
EEWE
PROGRAM HEADER
J3
15PCMCIA
SO
CS
SI
SCK
EMU1
VBAT
R70
R71
R72
R73

FIG 2-61

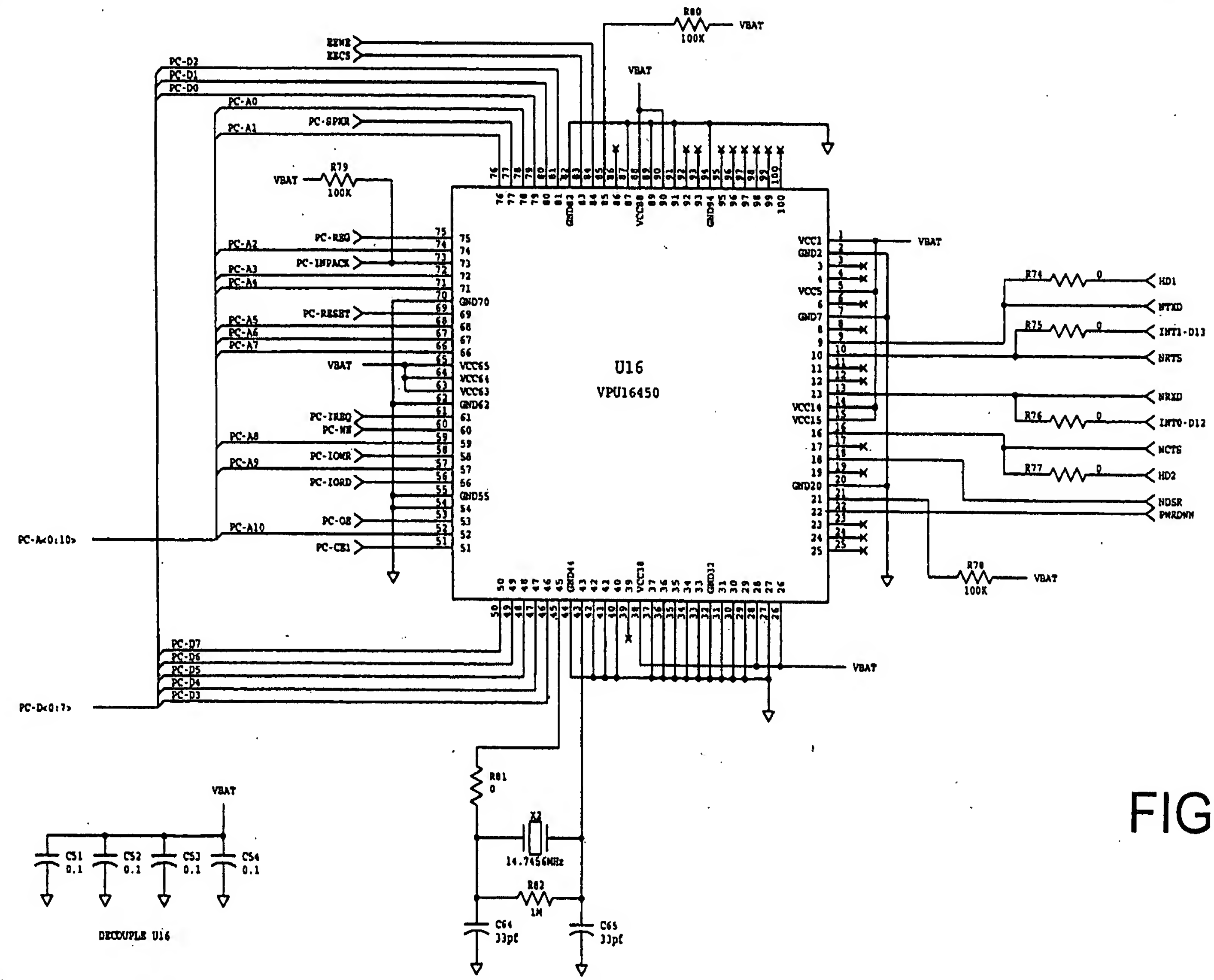


FIG 2-62

Replacement Sheet

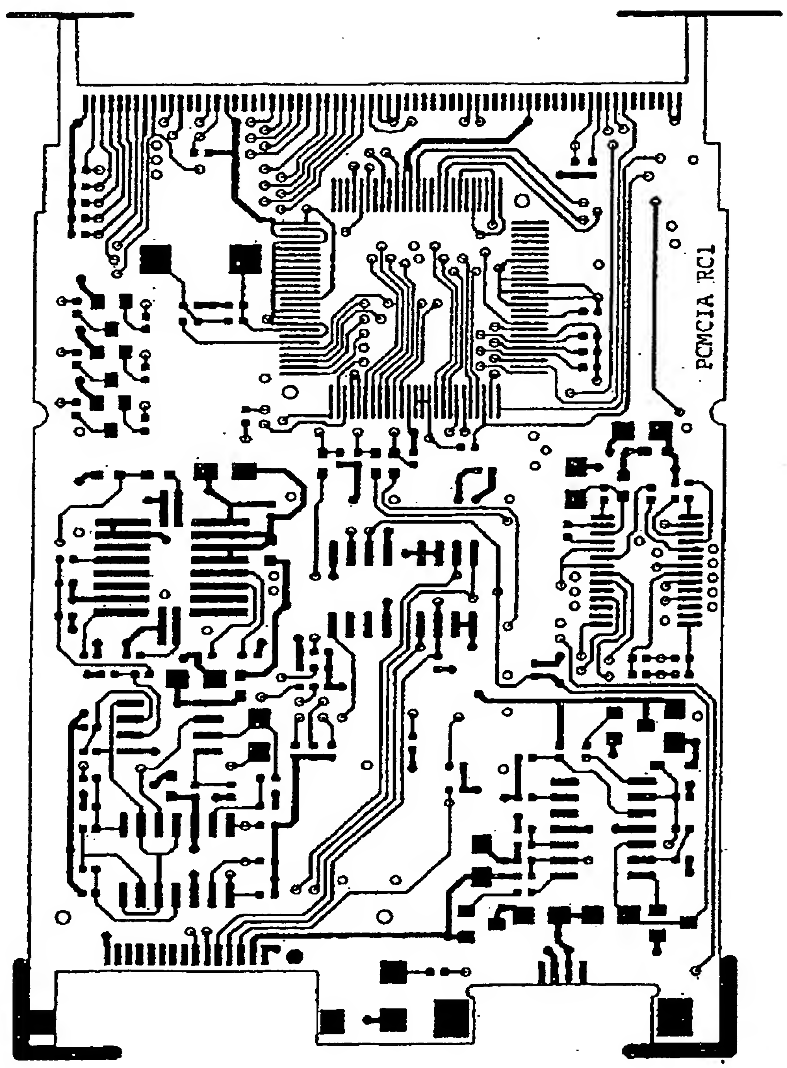


FIG. 2-63

Replacement Sheet

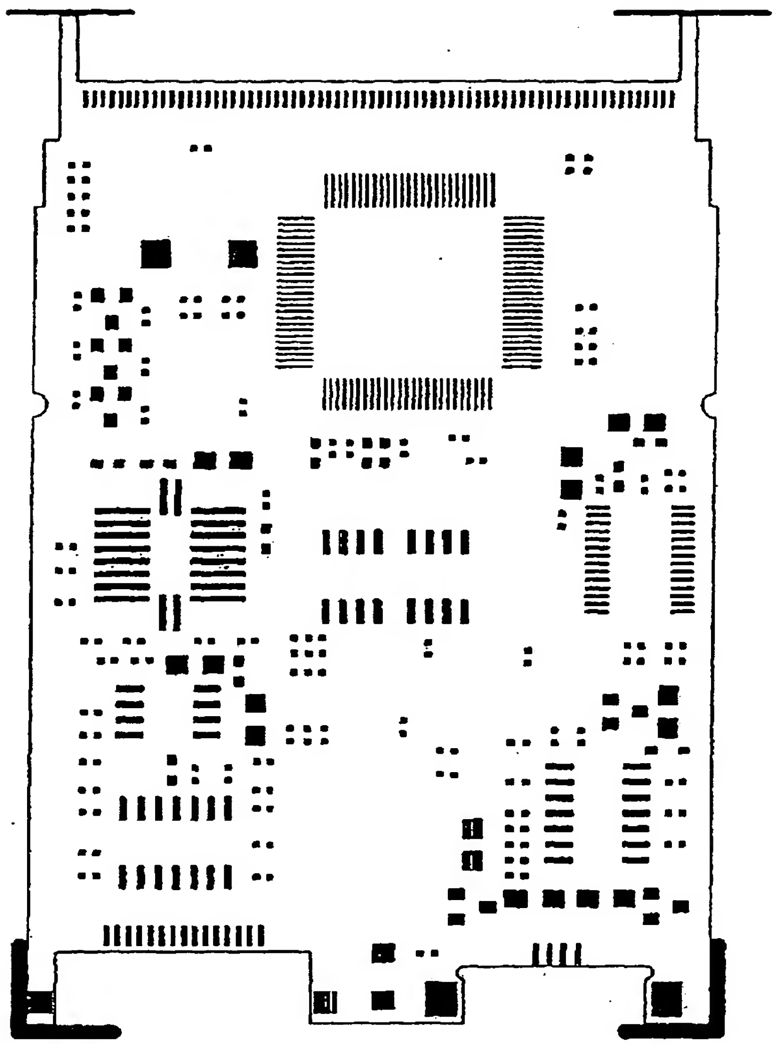


FIG. 2-64

Replacement Sheet

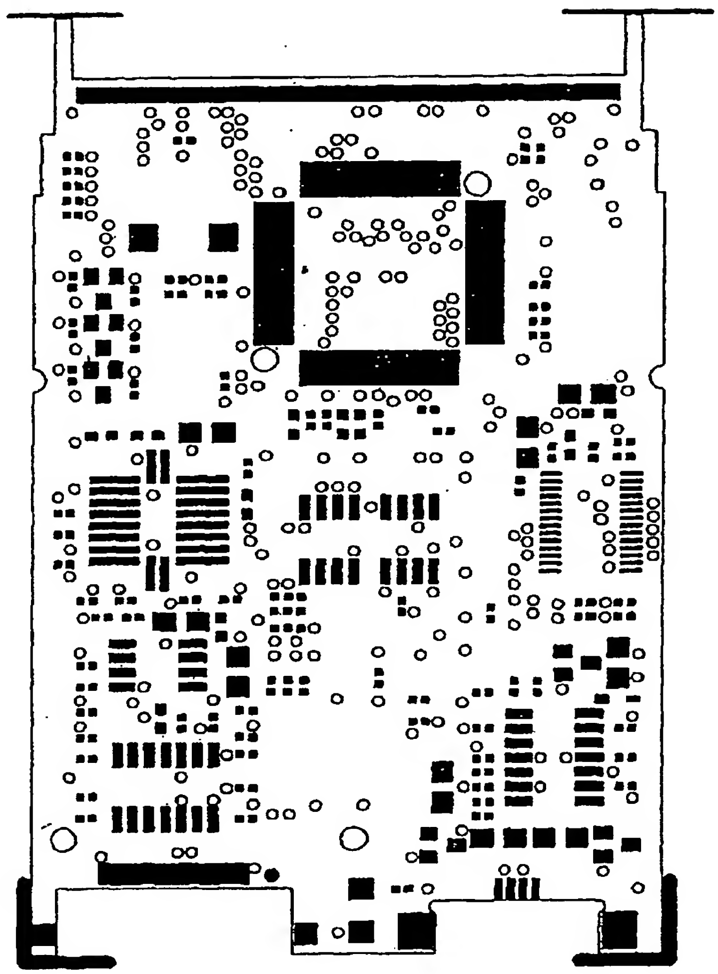


FIG. 2-65

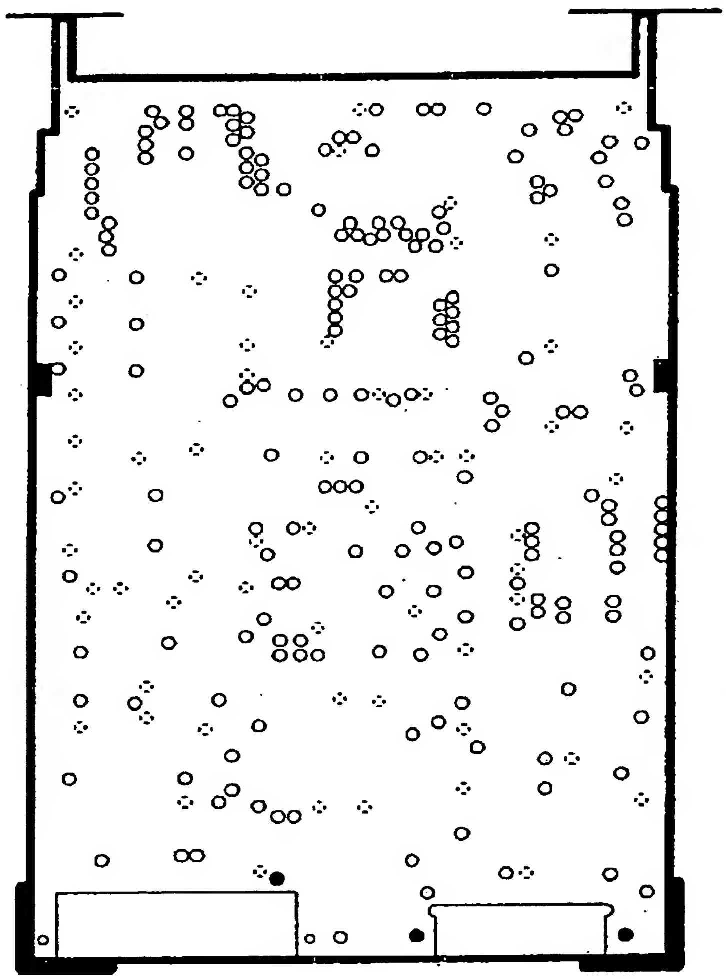


FIG. 2-66

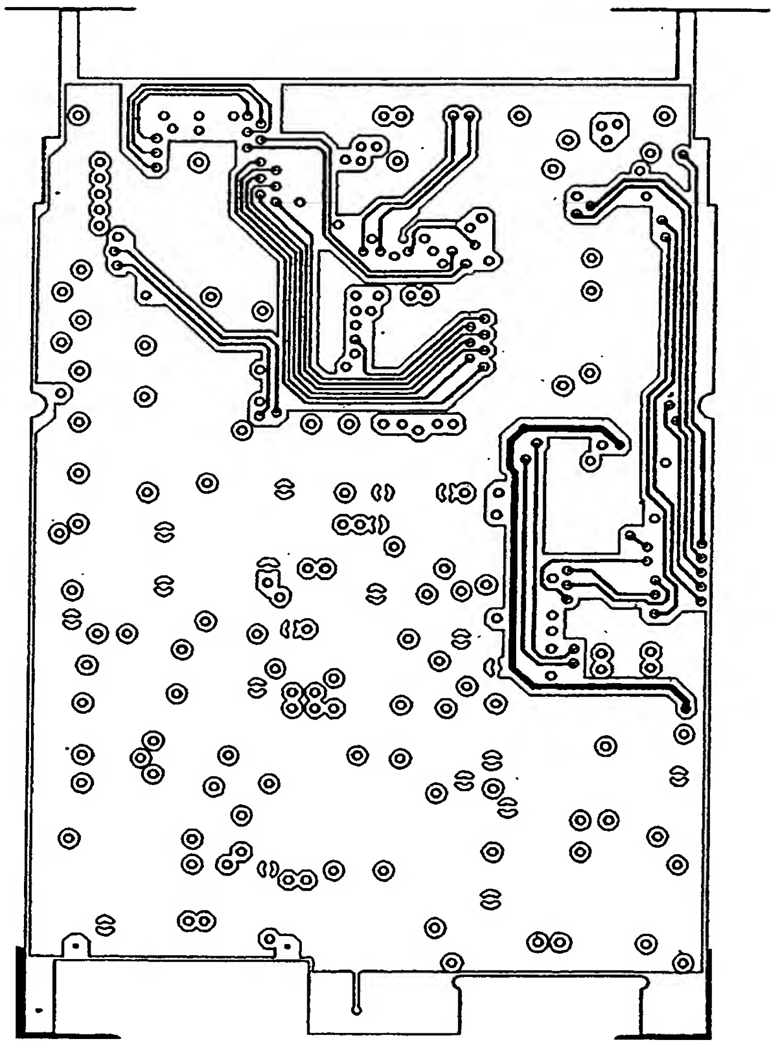


FIG. 2-67

Replacement Sheet

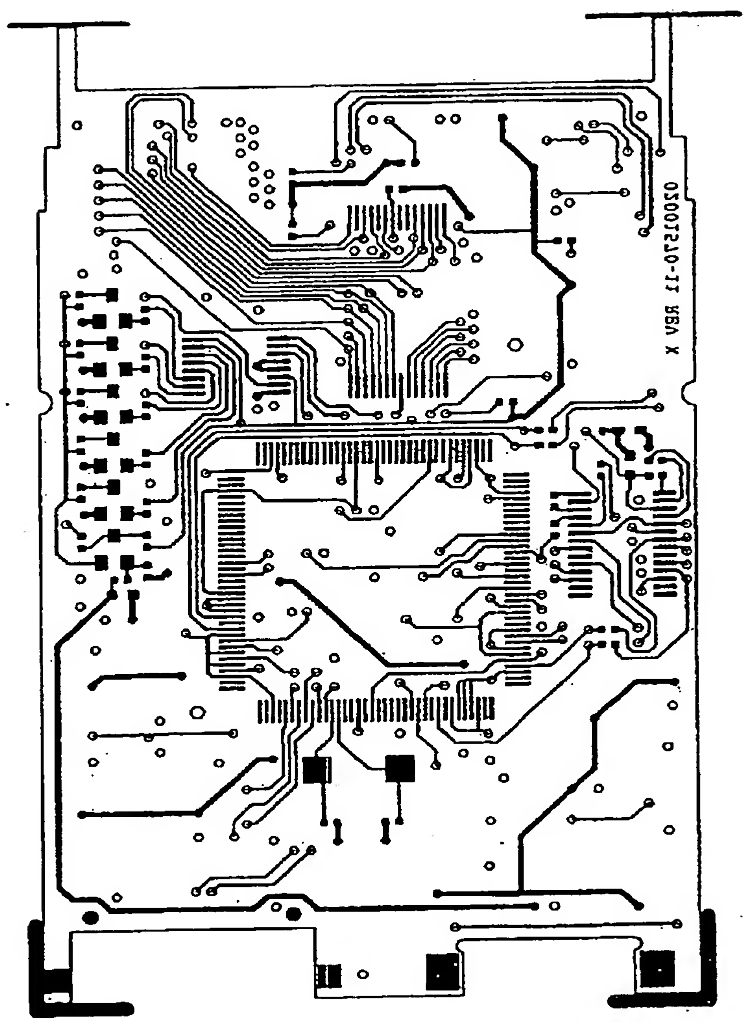


FIG. 2-68

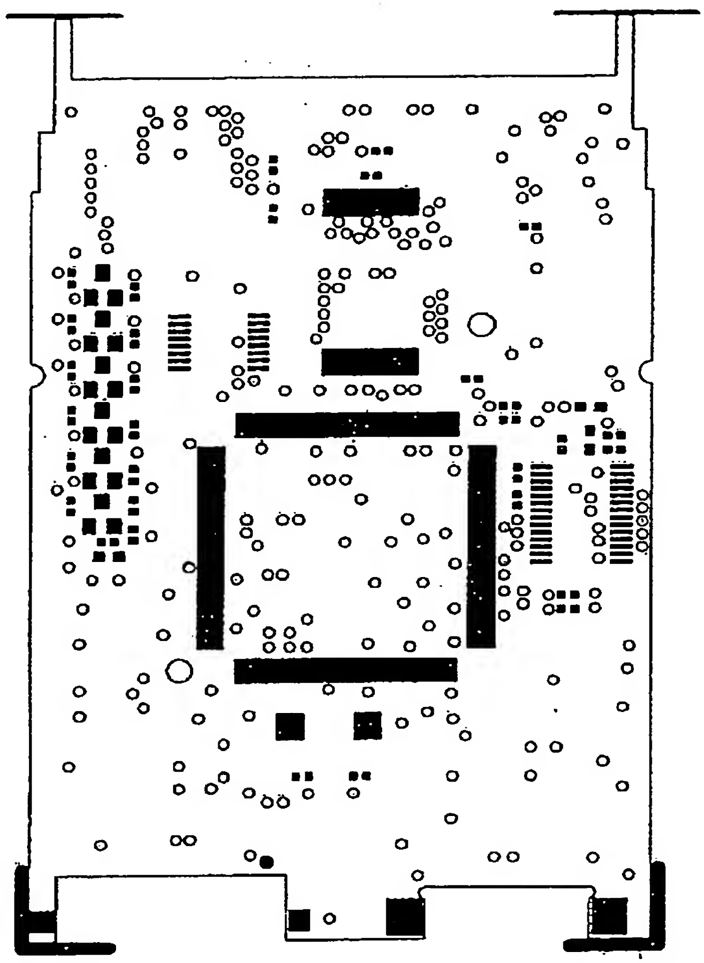


FIG. 2-69

Replacement Sheet

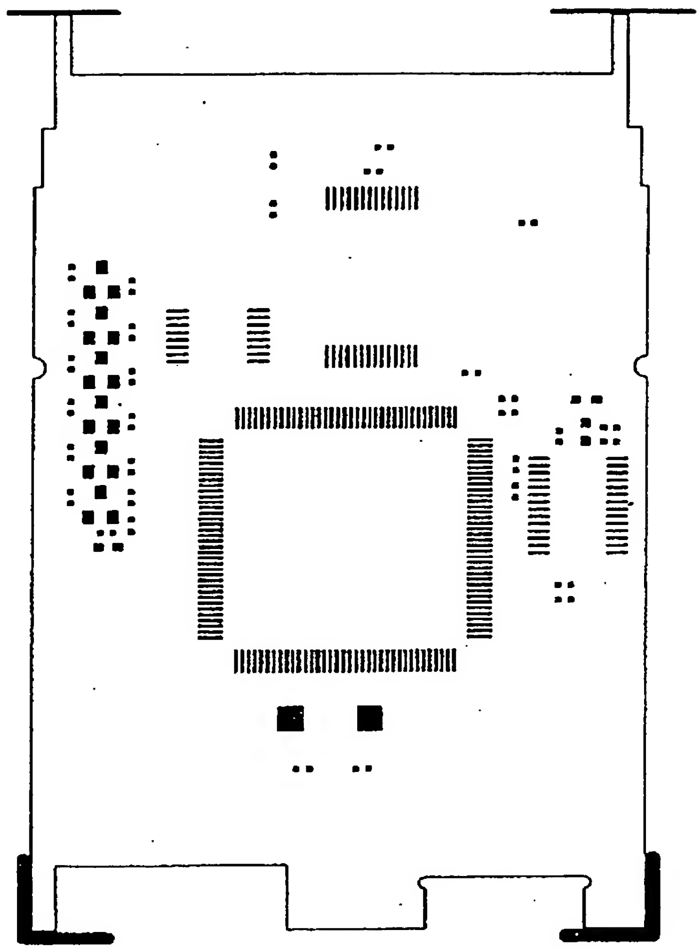


FIG. 2-70

Replacement Sheet

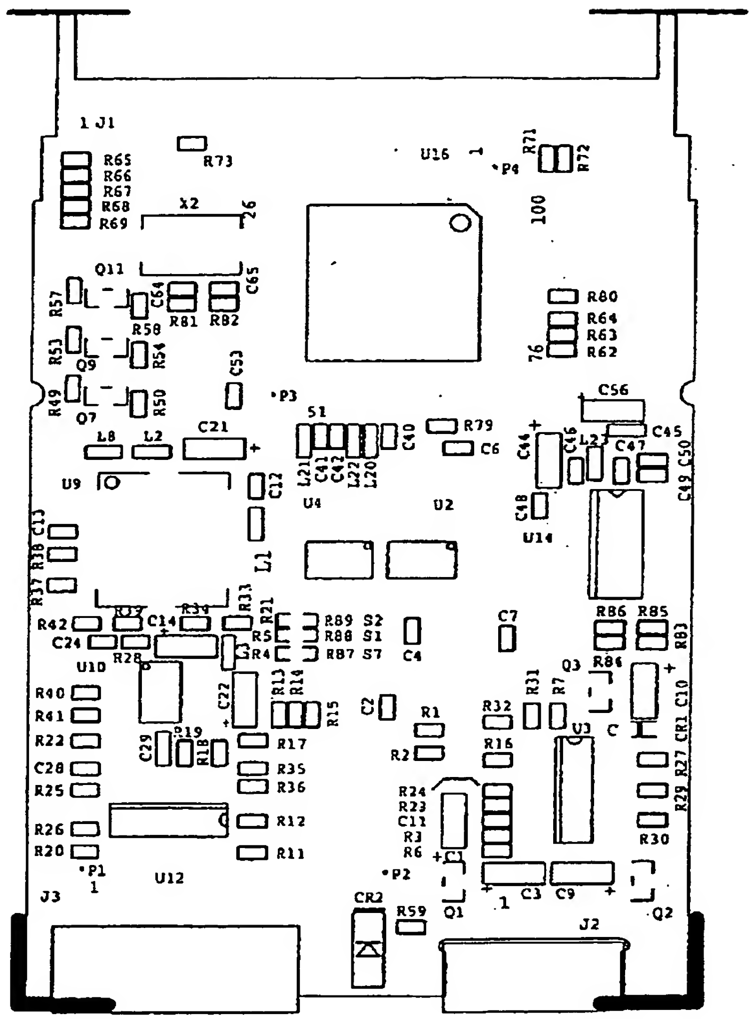


FIG. 2-71

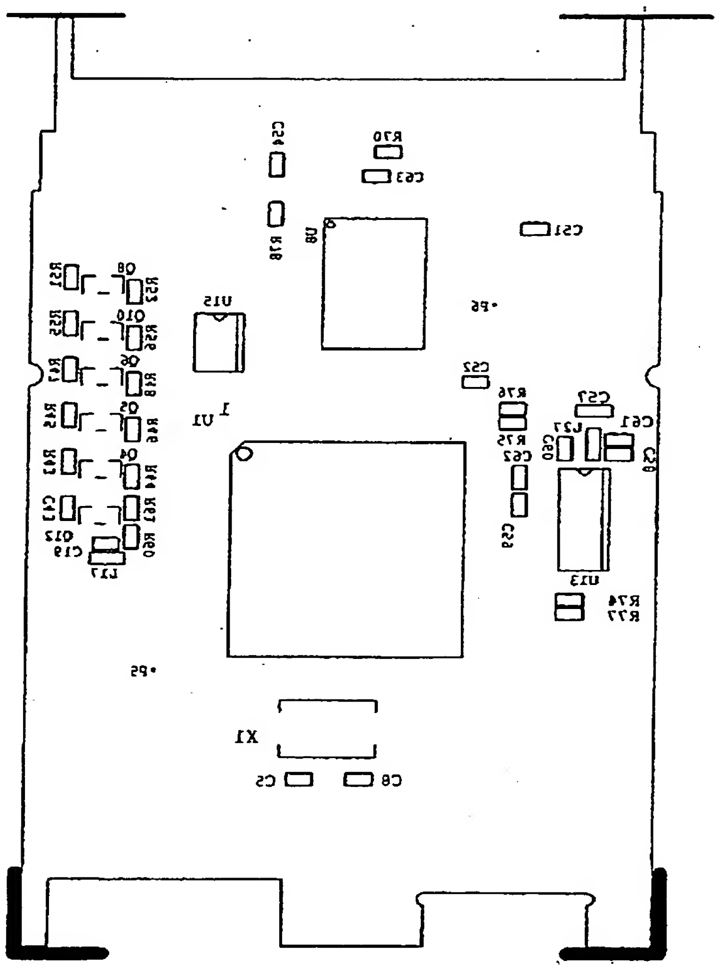

R70
C63
C54
R78
U8
C51
U15
P5
C52
R76
C57
C61
L27
C50
R75
C62
C53
U13
R74
R77
U1
X1
C5
C8

FIG. 2-72

Replacement Sheet

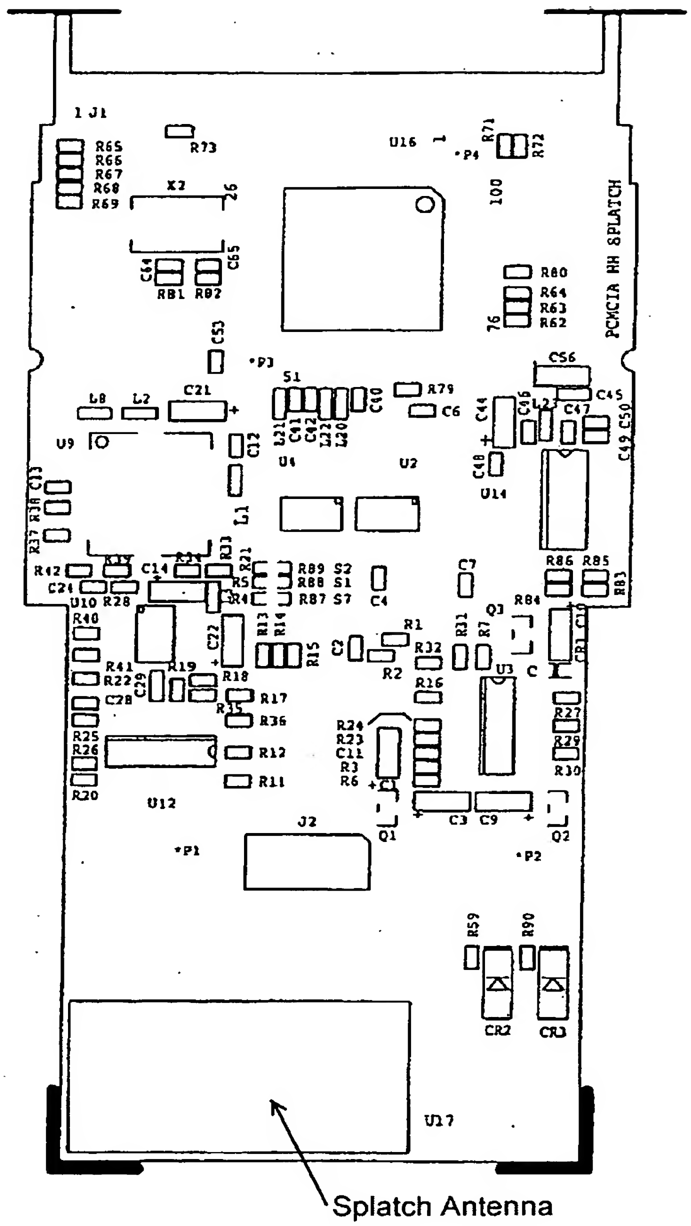


FIG. 2-73

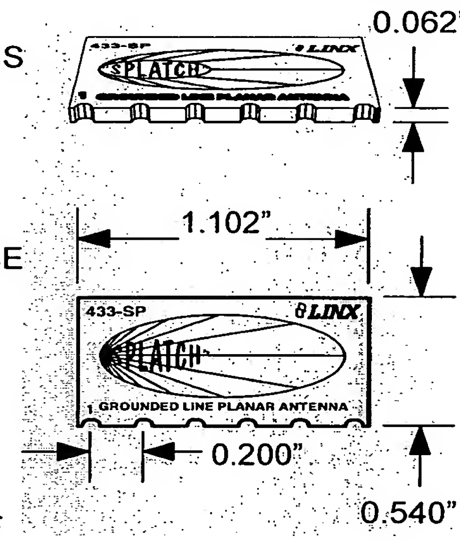
WIRELESS PRODUCTS TEL 70 22 69 70
FAX 70 22 69 80
WWW. WIRELESS-PRODUCTS.DK

SPLATCH PLANAR ANTENNA WP-L-ANT-XXX-SP

SP SERIES

THE SPLATCH USES A GROUNDED LINE TECHNIQUE TO ACHIEVE OUTSTANDING PERFORMANCE FROM A TINY SURFACE-MOUNT ELEMENT. THIS UNIQUE ANTENNA IS DESIGNED FOR HAND OR REFLOW MOUNTING DIRECTLY TO A PRODUCT'S CIRCUIT BOARD. ITS LOW COST MAKES IT IDEAL FOR VOLUME APPLICATION. UNLIKE MANY COMPACT ANTENNAS THE SPLATCH EXHIBITS GOOD PROXIMITY PERFORMANCE MAKING IT AN APPROPRIATE CHOICE FOR HAND-HELD APPLICATIONS SUCH AS REMOTE CONTROLS, PAGERS, AND ALERT DEVICES. TYPICAL PERFORMANCE IS BELOW THAT OF MANY EXTERNAL ANTENNAS BUT THE SPLATCH IS AN EXCELLENT CHOICE WHEN COSMETIC OR MECHANICAL ISSUES DICTATE THE USE OF AN INTERNAL ANTENNA.

TECHNICAL DRAWING



FEATURES

- IDEAL FOR CONCEALED/INTERNAL MOUNTING
- DIRECT PCB ATTACHMENT
- ULTRA-COMPACT PACKAGE
- VERY LOW COST
- SUITABLE FOR HAND OR REFLOW ASSEMBLY
- RESISTANT TO PROXIMITY EFFECT
- PERFECT FOR COMPACT PORTABLE DEVICES

ORDERING INFORMATION

PART NO.	DESCRIPTION
WP-L-ANT-315-SP	315 MHZ SPLATCH PLANAR ANTENNA
WP-L-ANT-418-SP	418 MHZ SPLATCH PLANAR ANTENNA
WP-L-ANT-433-SP	433 MHZ SPLATCH PLANAR ANTENNA
WP-L-ANT-868-SP	868 MHZ SPLATCH PLANAR ANTENNA
WP-L-ANT-916-SP	916 MHZ SPLATCH PLANAR ANTENNA

 BlueTooth • GSM Engine • GPS Engine • Radio Modules • Data Radio • RF RemoteVideo TX/RX • Antenners • Security • Point to Point • Point to Multi Point Radio • Dect engineSynthesised multi-channel • Xplore PC • Embedded-WEB • Paging • RTU • IQ • SMS

FIG. 2-74

Replacement Sheet

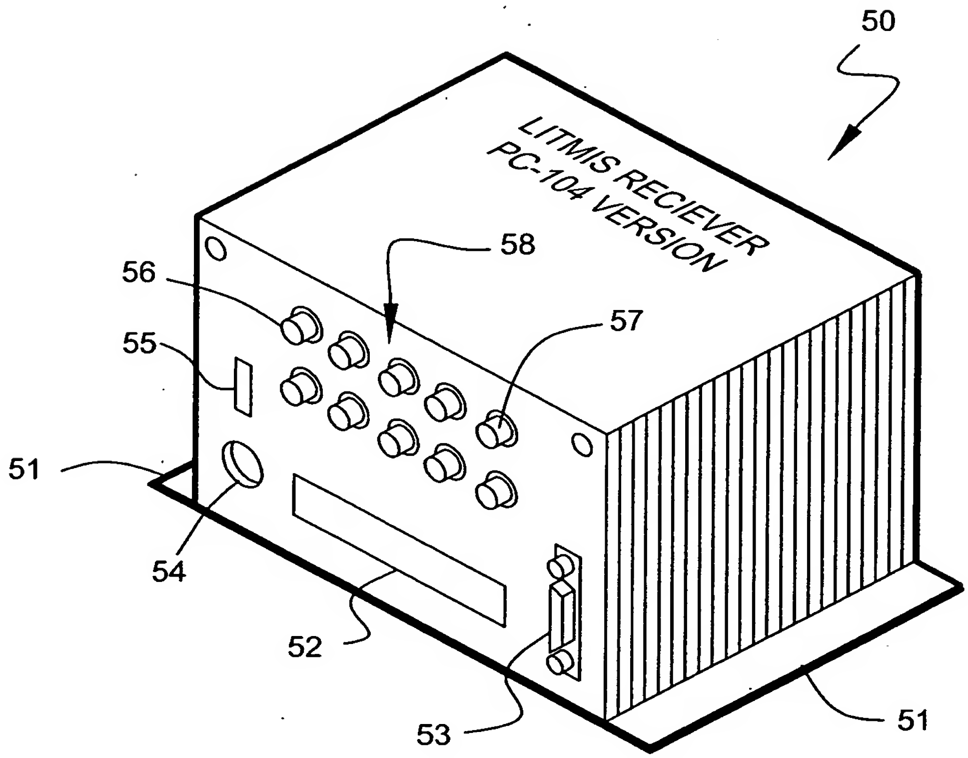


FIG. 2-75

Replacement Sheet

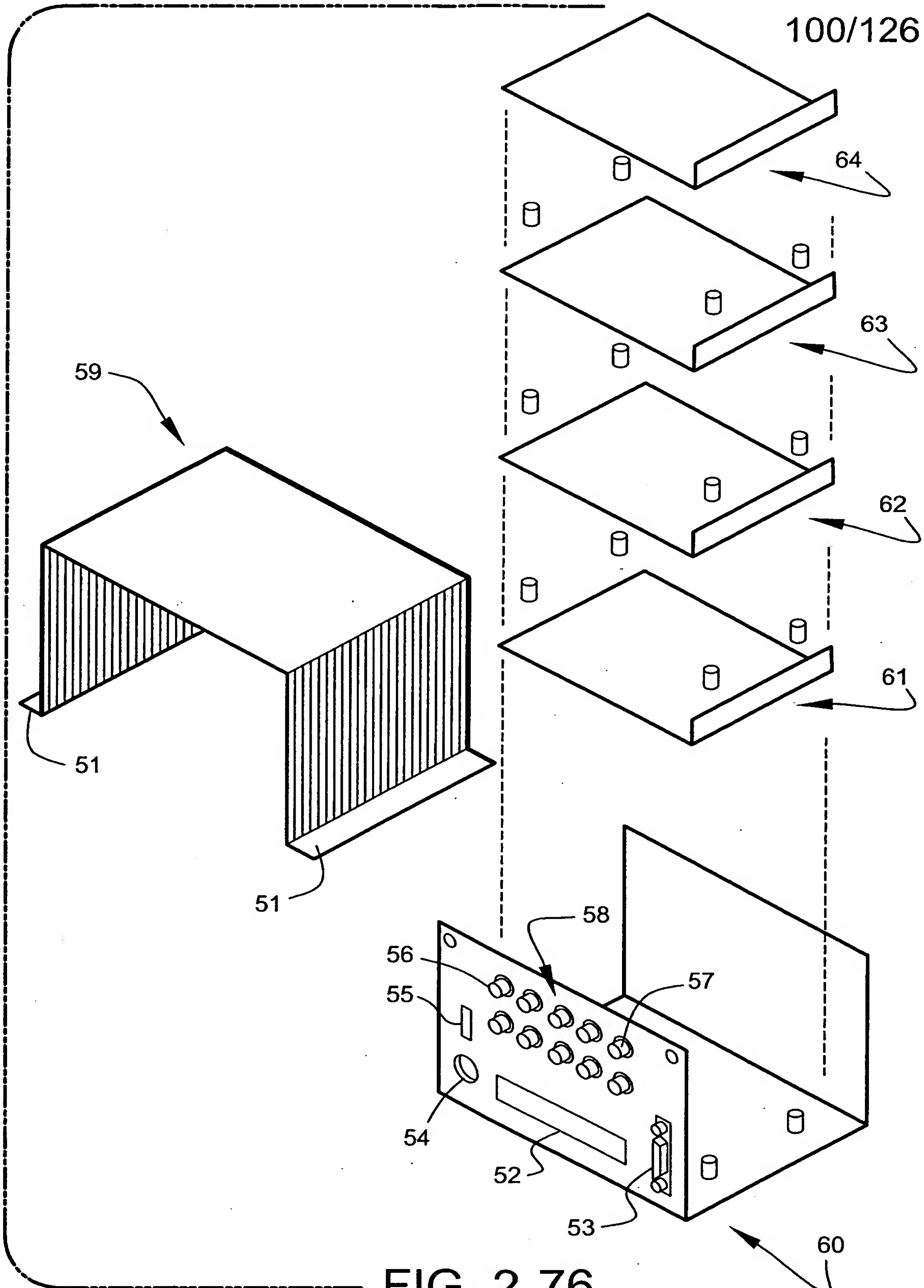


FIG. 2-76

Replacement Sheet

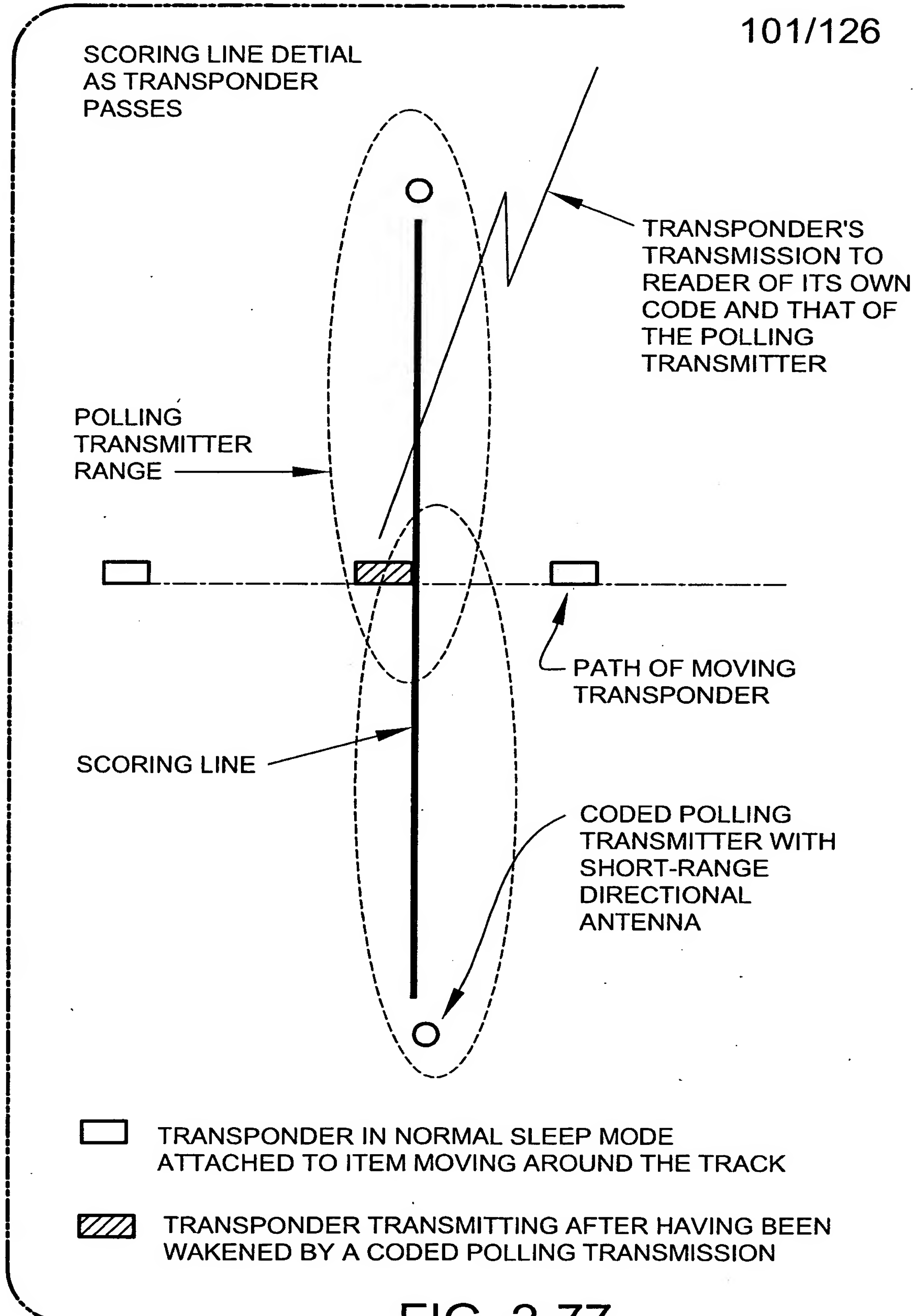


FIG. 2-77

Replacement Sheet

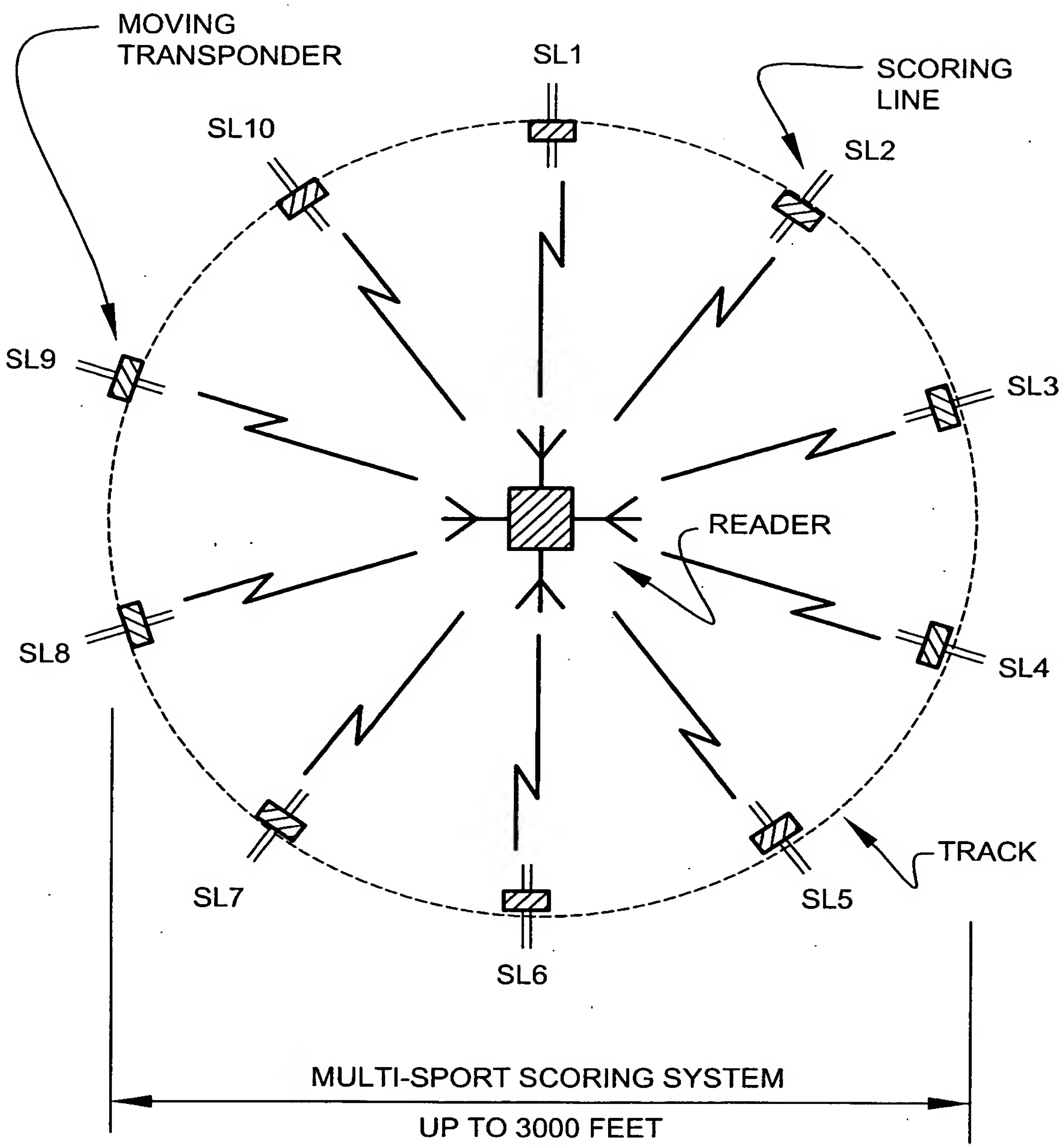
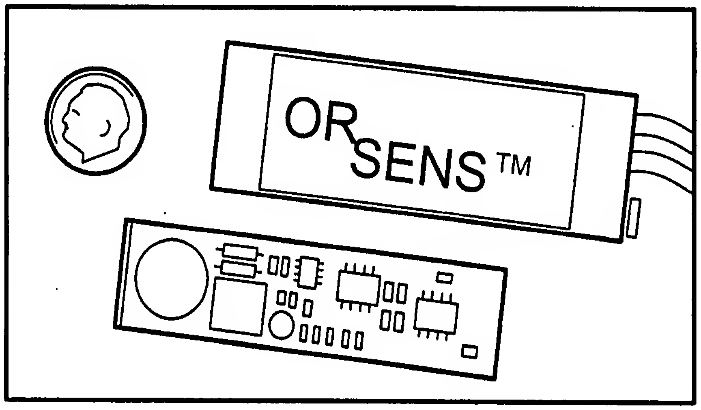


FIG. 2-78

ORSENS

OAK RIDGE SYSYEMS FOR ENHANCED NUCLEAR SAFEGUARDS

RATELL™ GAMMA-RAY DETECTOR



OVERVIEW

The RADTELL™ gamma-ray sensor is a small, inexpensive, virtually passive hardware system designed for individual-item monitoring of radioactive materials. The system provides a method for maintaining 24-hour surveillance of stored radioactive items and recording any gamma-ray change. The system can be retrofitted into existing storage configurations and operated in (SEE FIG 2-79b)

FIG. 2-79a

either a fixed or mobile mode. Applications include nonproliferation monitoring, spent fuel safeguards, and long-term monitoring of stored radioactive wastes.

Features

- Gamma-ray attribute measurement of each item in storage
- Discriminator lower level adjustment to correspond to an energy peak of uranium-235 (98 keV) or plutonium-239 (130 keV)
- Automatic indication of system problems
- Pulse height discrimination of unwanted noise
- Analog signal output
- Single +9 V supply requirement for power and detector bias (with optional high-voltage bias output)
- Stable low-cost preamplifier-amplifier electronics

System Operation

RADTELL™ sensors monitor the gamma-ray emission from special nuclear materials (SNMs). The sensors are affected by source (SNM) distance, collimation of the source, and the SNM container thickness and material. The

FIG. 2-79b1

count-rate is maximized by placing the sensors as close as possible to the source.

Main elements within the sensor unit are a CdZnTe gamma-ray detector, a low-noise preamplifier, and a pulse-shaping amplifier. Signal levels can be selected by a pulse height discriminator, lower-level adjustment for precise gamma-ray energy band monitoring of uranium-235. The Surface Mount Technology (SMT) circuit board is designed for use with either a silicon-PIN photodiode or a CdZnTe gamma-ray radiation detector.

Pulses resulting from the photon interactions in the RADTELL™ detector are produced at an approximate rate of 75,000 counts per second per R per hour. Filters in the pulse-shaping amplifier provide an impulse response having a pulse-width of 20 to 50 microseconds. After leaving the pulse-shaping amplifier, the output signals go to a pulse height discriminator where the discriminator lower level is adjusted to correspond to an energy peak of uranium-235 (98 keV) or plutonium-239 (130 keV). The gamma-ray energy band from either the calibrated uranium or plutonium peak to the highest energy from the Compton

FIG. 2-79b2

interaction pulses provides a sensitivity band with a precise region for monitoring either uranium enrichment or plutonium.
The SMT circuit board is 1.5 cm wide by 7.2 cm long.

Hardware/Software Requirements
- ORSENS Sensor Concentrator
- ORSENS Common Sensor Interface Unit
- An Intel Pentium II based computer (or higher)
- At least 32 MB of RAM
- A minimum of 15 MB of free hard disk space

For more information, contact
Mr. Chris A. Pickett
Y-12 National Security Complex
Voice: (865) 574-0891 Fax: (865) 576-2782
email: pickettca@y12.doe.gov

FIG. 2-79c

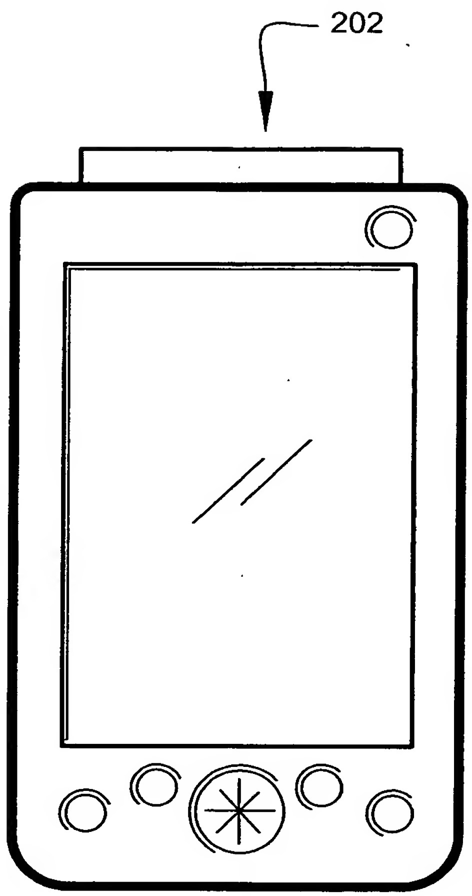


FIG. 2-80

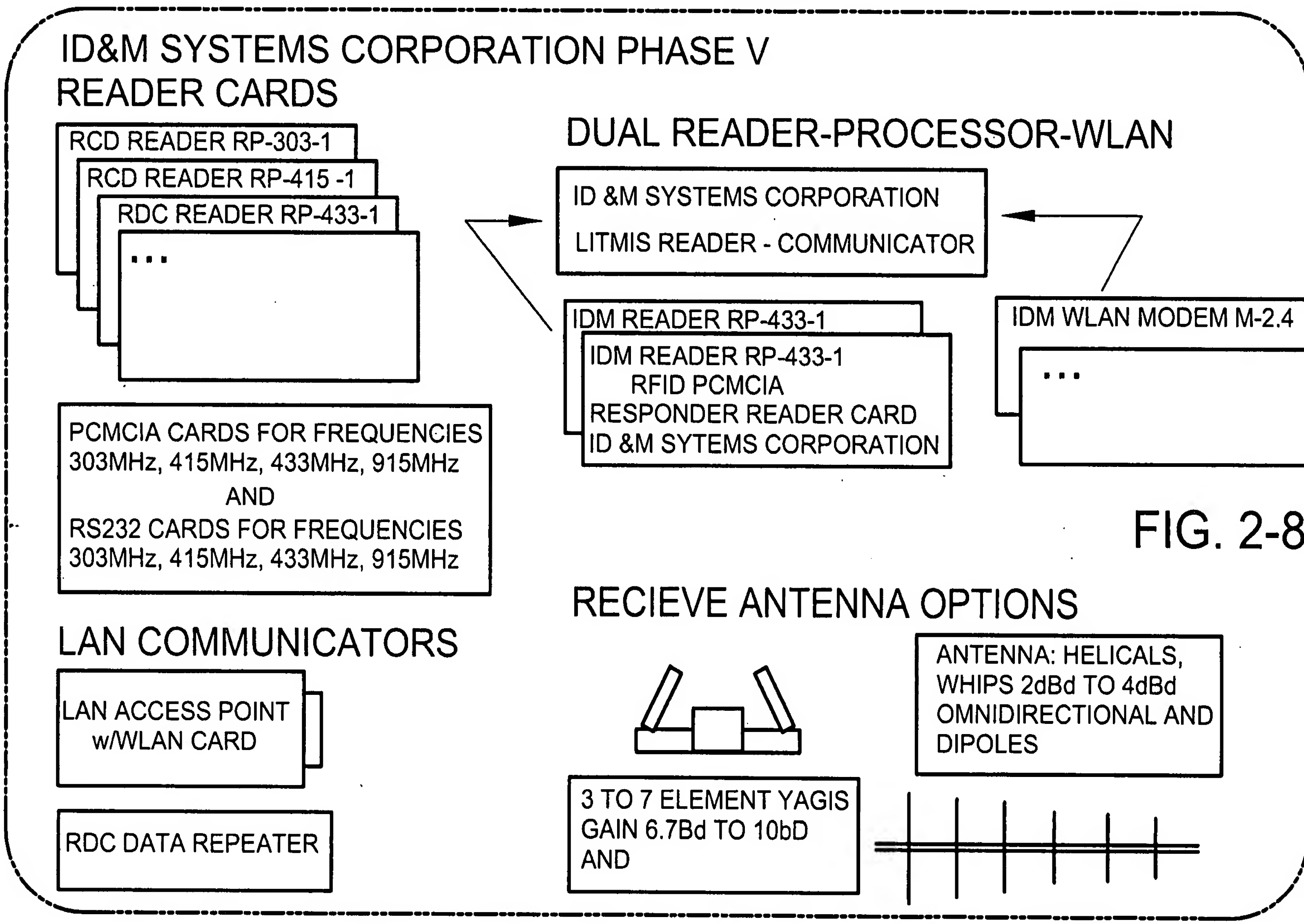

ID&M SYSTEMS CORPORATION PHASE V
READER CARDS
RCD READER RP-303-1
RCD READER RP-415 -1
RDC READER RP-433-1
...
PCMCIA CARDS FOR FREQUENCIES
303MHz, 415MHz, 433MHz, 915MHz
AND
RS232 CARDS FOR FREQUENCIES
303MHz, 415MHz, 433MHz, 915MHz
LAN COMMUNICATORS
LAN ACCESS POINT
w/WLAN CARD
RDC DATA REPEATER
DUAL READER-PROCESSOR-WLAN
ID &M SYSTEMS CORPORATION
LITMIS READER - COMMUNICATOR
IDM READER RP-433-1
IDM READER RP-433-1
RFID PCMCIA
RESPONDER READER CARD
ID &M SYTEMS CORPORATION
IDM WLAN MODEM M-2.4
...
RECIEVE ANTENNA OPTIONS
ANTENNA: HELICALS,
WHIPS 2dBd TO 4dBd
OMNIDIRECTIONAL AND
DIPOLES
3 TO 7 ELEMENT YAGIS
GAIN 6.7Bd TO 10bD
AND

FIG. 2-81A

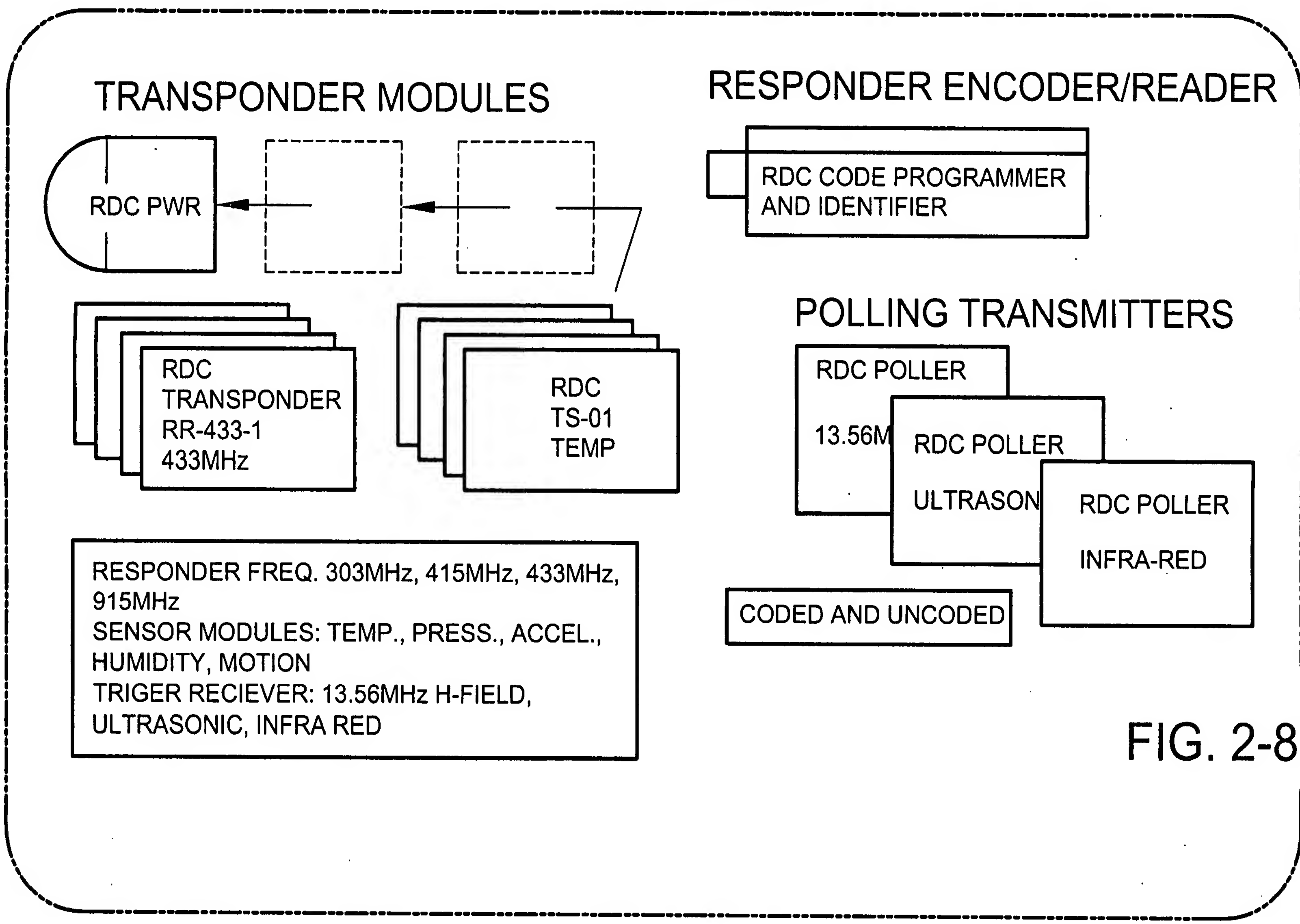
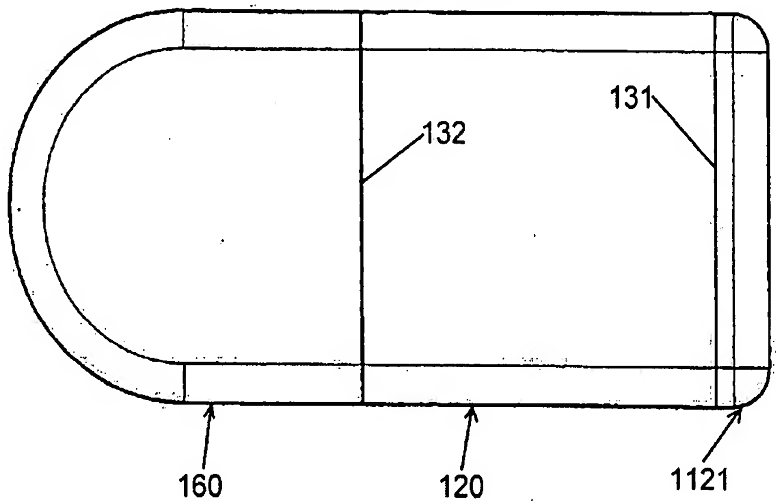

TRANSPONDER MODULES
RDC PWR
RDC
TRANSPONDER
RR-433-1
433MHz
RDC
TS-01
TEMP
RESPONDER FREQ. 303MHz, 415MHz, 433MHz, 915MHz
SENSOR MODULES: TEMP., PRESS., ACCEL., HUMIDITY, MOTION
TRIGER RECIEVER: 13.56MHz H-FIELD, ULTRASONIC, INFRA RED
RESPONDER ENCODER/READER
RDC CODE PROGRAMMER AND IDENTIFIER
POLLING TRANSMITTERS
RDC POLLER
13.56M
RDC POLLER
ULTRASON
RDC POLLER
INFRA-RED
CODED AND UNCODED

FIG. 2-81B

FIG. 3A



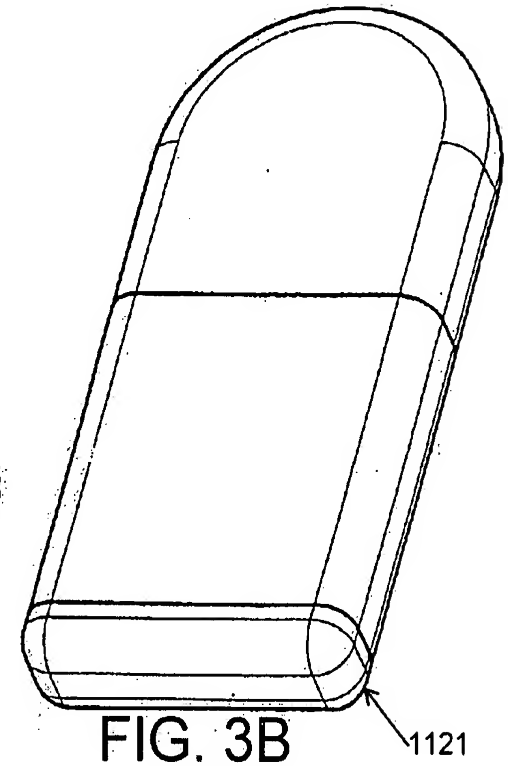


FIG. 3B

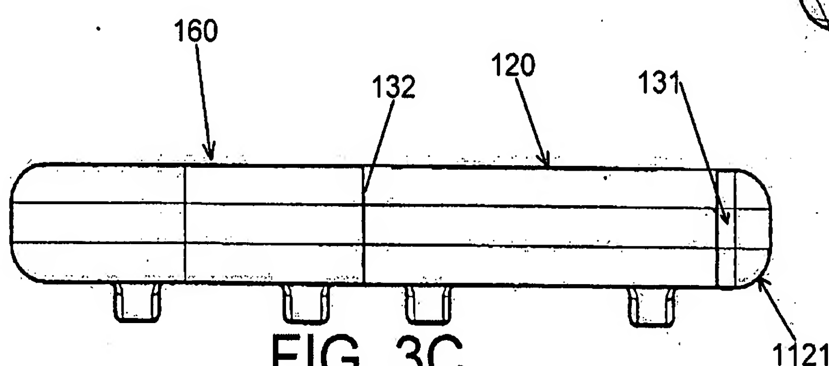


FIG. 3C

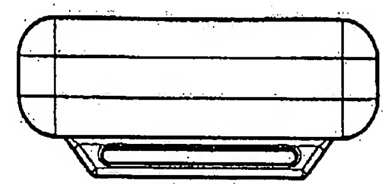


FIG. 3D

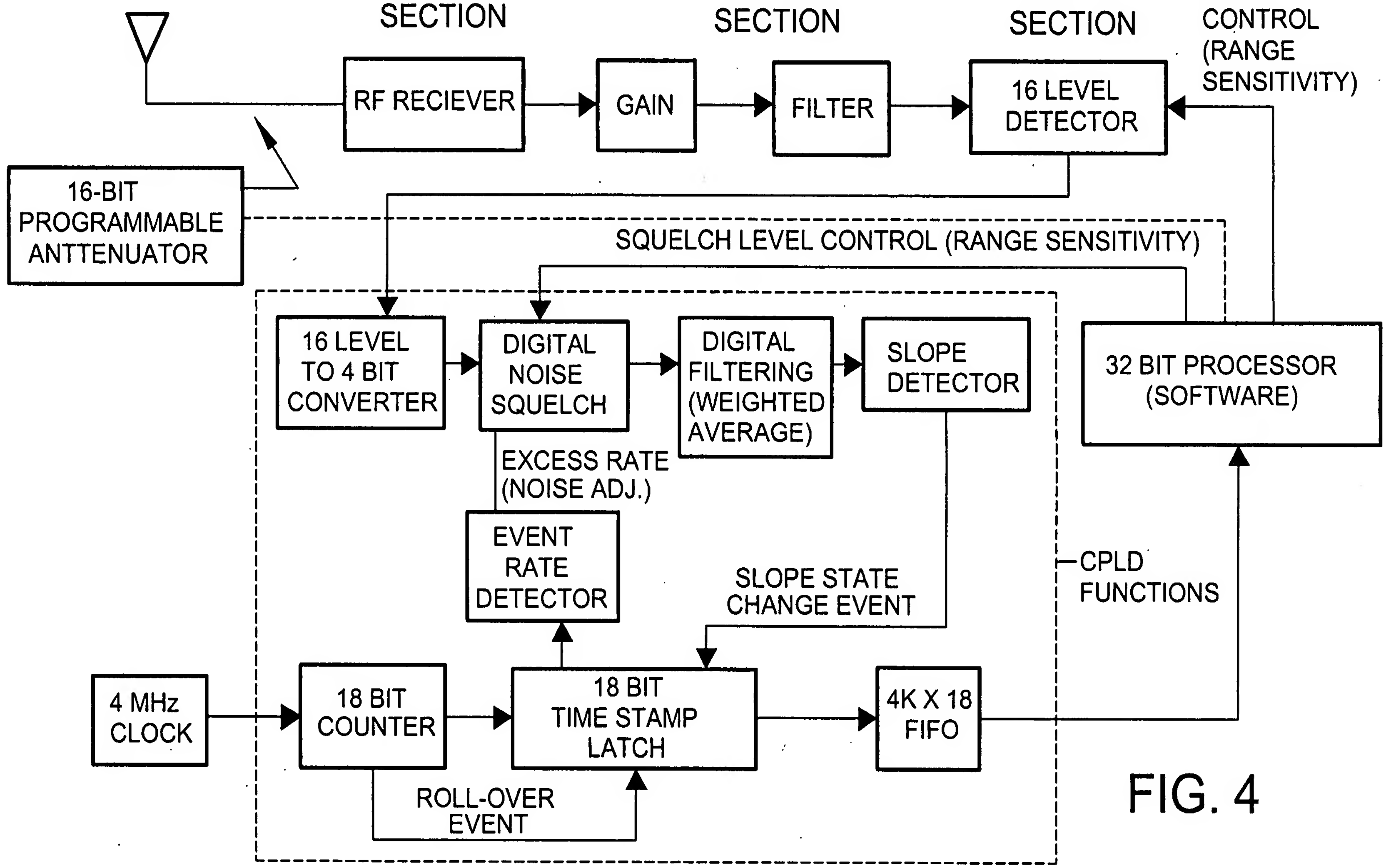

RF
SECTION
ANALOG
SECTION
DIGITAL
SECTION
DETECTOR
LEVEL
CONTROL
(RANGE
SENSITIVITY)
RF RECIEVER
GAIN
FILTER
16 LEVEL
DETECTOR
16-BIT
PROGRAMMABLE
ANTTENUATOR
SQUELCH LEVEL CONTROL (RANGE SENSITIVITY)
16 LEVEL
TO 4 BIT
CONVERTER
DIGITAL
NOISE
SQUELCH
DIGITAL
FILTERING
(WEIGHTED
AVERAGE)
SLOPE
DETECTOR
32 BIT PROCESSOR
(SOFTWARE)
EXCESS RATE
(NOISE ADJ.)
EVENT
RATE
DETECTOR
SLOPE STATE
CHANGE EVENT
CPLD
FUNCTIONS
4 MHz
CLOCK
18 BIT
COUNTER
18 BIT
TIME STAMP
LATCH
4K X 18
FIFO
ROLL-OVER
EVENT

FIG. 4

Replacement Sheet

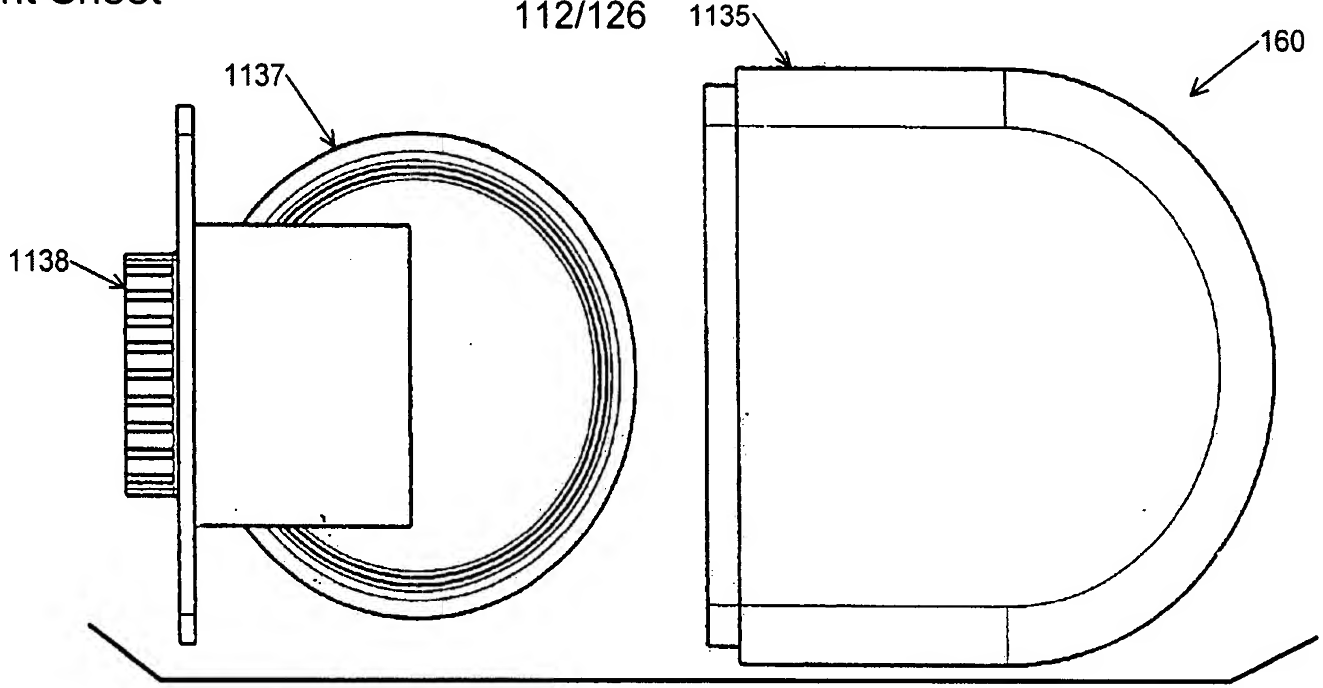


FIG. 5A

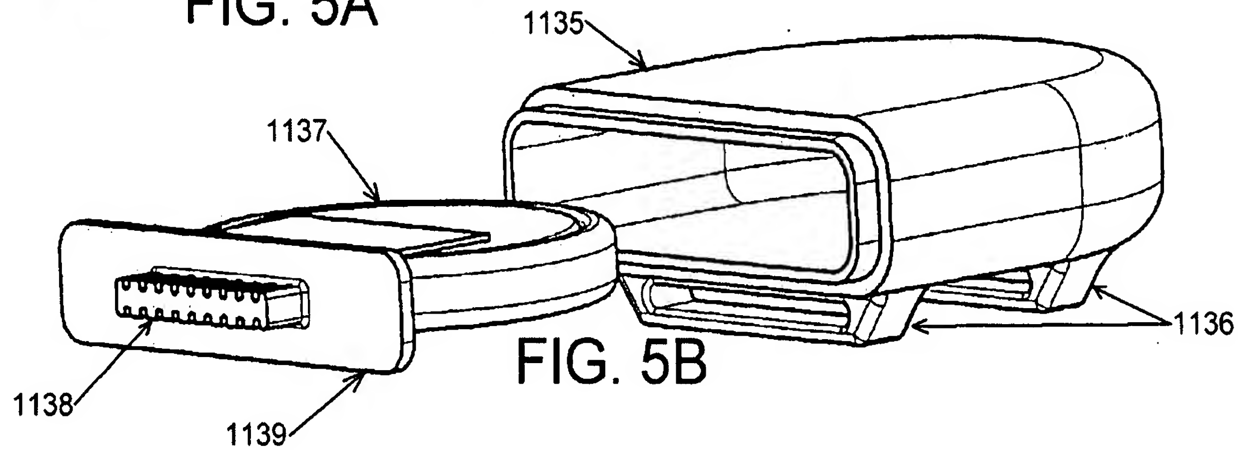


FIG. 5B

TRANSCEIVER CIRCUIT FOR TRANSPONDERS AND RECEIVERS COMMUNICATING ON THE SAME FREQUENCY

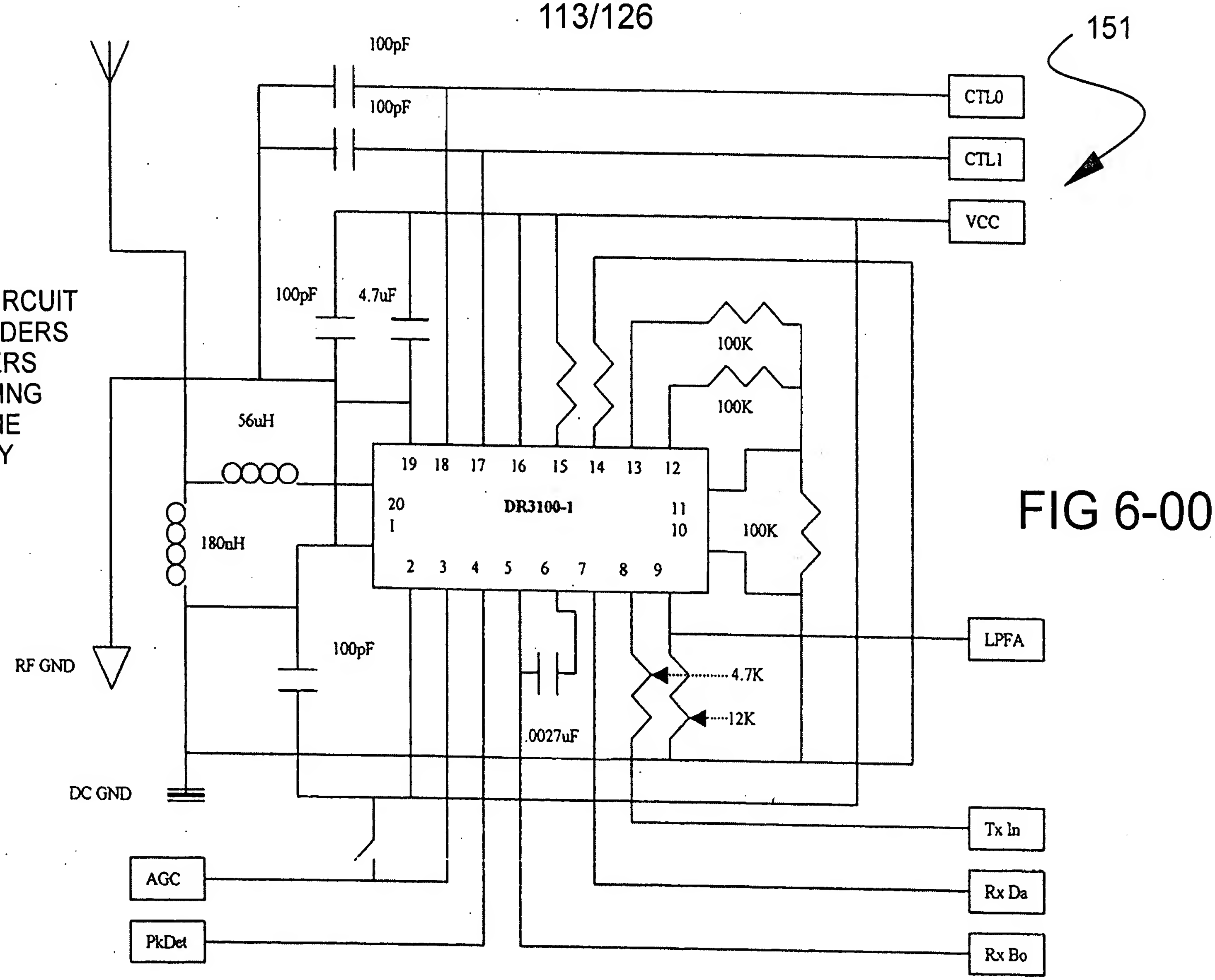


FIG 6-00

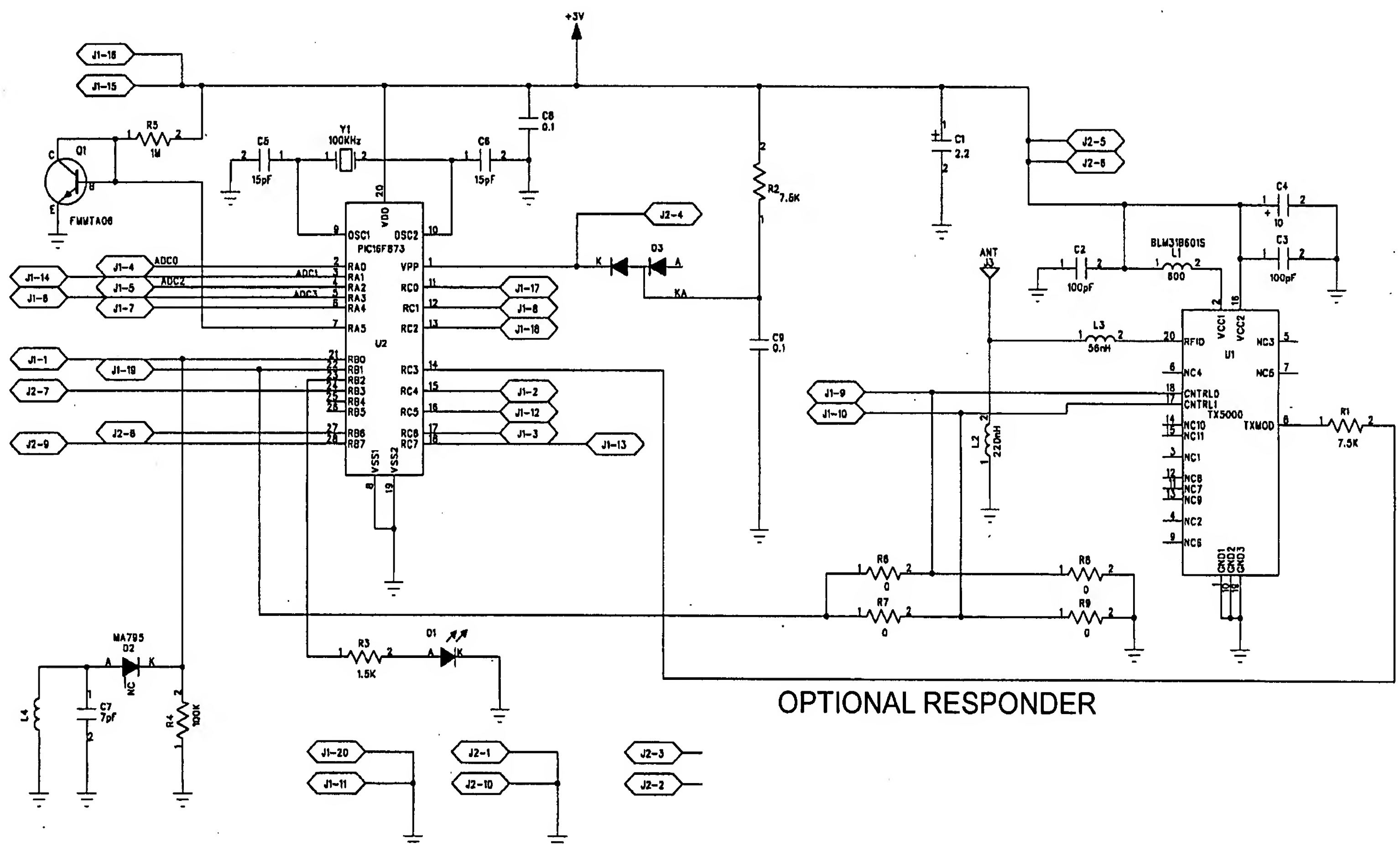

+3V
J1-16
J1-15
R5
1M
Q1
FMMTA06
C5
15pF
Y1
100KHz
C6
15pF
C8
0.1
R2
7.5K
C1
2.2
J2-5
J2-6
C4
10
C3
100pF
C2
100pF
BLM31B601S
L1
600
J2-4
D3
KA
C9
0.1
ANT
J3
L3
56nH
L2
220nH
PIC16F873
U2
OSC1
OSC2
VDD
VPP
RA0
RA1
RA2
RA3
RA4
RA5
RB0
RB1
RB2
RB3
RB4
RB5
RB6
RB7
RC0
RC1
RC2
RC3
RC4
RC5
RC6
RC7
VSS1
VSS2
ADC0
ADC1
ADC2
ADC3
J1-14
J1-6
J1-4
J1-5
J1-7
J1-1
J1-19
J2-7
J2-9
J2-8
J1-17
J1-8
J1-18
J1-2
J1-12
J1-3
J1-13
U1
TX5000
RFID
VCC1
VCC2
NC3
NC5
NC4
CNTRL0
CNTRL1
TXMOD
NC10
NC11
NC1
NC8
NC7
NC9
NC2
NC6
GND1
GND2
GND3
R1
7.5K
J1-9
J1-10
R6
R7
R8
R9
MA795
D2
NC
C7
7pF
L4
R4
100K
R3
1.5K
D1
J1-20
J1-11
J2-1
J2-10
J2-3
J2-2
OPTIONAL RESPONDER

FIG 6-01

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-01-01	433.92MHz	Optional	None	Basic Demo
03-000139-01-02	433.92MHz	Optional	None	SSI WAMS
03-000139-01-03	433.92MHz	Optional	None	S&G Code
03-000139-01-04	433.92MHz	Optional	None	Medical 1
03-000139-02-05	433.92MHz	Optional	None	Home Sec. 1
03-000139-02-01	433.92MHz	OOK	None	Basic Demo
03-000139-02-02	433.92MHz	OOK	None	SSI WAMS
03-000139-02-03	433.92MHz	OOK	None	S&G Code
03-000139-02-04	433.92MHz	OOK	None	Medical 1
03-000139-02-05	433.92MHz	OOK	None	Home Sec. 1
03-000139-03-01	433.92MHz	ASK	None	Basic Demo
03-000139-03-02	433.92MHz	ASK	None	SSI WAMS
03-000139-03-03	433.92MHz	ASK	None	S&G Code
03-000139-03-04	433.92MHz	ASK	None	Medical 1
03-000139-03-05	433.92MHz	ASK	None	Home Sec. 1
03-000139-11-01	303.825MHz	Optional	None	Basic Demo
03-000139-11-02	303.825MHz	Optional	None	SSI WAMS
03-000139-11-03	303.825MHz	Optional	None	S&G Code
03-000139-11-04	303.825MHz	Optional	None	Medical 1
03-000139-11-05	303.825MHz	Optional	None	Home Sec. 1
03-000139-12-01	303.825MHz	OOK	None	Basic Demo
03-000139-12-02	303.825MHz	OOK	None	SSI WAMS
03-000139-12-03	303.825MHz	OOK	None	S&G Code
03-000139-12-04	303.825MHz	OOK	None	Medical 1
03-000139-12-05	303.825MHz	OOK	None	Home Sec. 1
03-000139-13-01	303.825MHz	ASK	None	Basic Demo
03-000139-13-02	303.825MHz	ASK	None	SSI WAMS
03-000139-13-03	303.825MHz	ASK	None	S&G Code
03-000139-13-04	303.825MHz	ASK	None	Medical 1
03-000139-13-05	303.825MHz	ASK	None	Home Sec. 1

FIG. 7A

Replacement Sheet

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-21-01	418MHz	Optional	None	Basic Demo
03-000139-21-02	418MHz	Optional	None	SSI WAMS
03-000139-21-03	418MHz	Optional	None	S&G Code
03-000139-21-04	418MHz	Optional	None	Medical 1
03-000139-22-05	418MHz	Optional	None	Home Sec. 1
03-000139-22-01	418MHz	OOK	None	Basic Demo
03-000139-22-02	418MHz	OOK	None	SSI WAMS
03-000139-22-03	418MHz	OOK	None	S&G Code
03-000139-22-04	418MHz	OOK	None	Medical 1
03-000139-22-05	418MHz	OOK	None	Home Sec. 1
03-000139-23-01	418MHz	ASK	None	Basic Demo
03-000139-23-02	418MHz	ASK	None	SSI WAMS
03-000139-23-03	418MHz	ASK	None	S&G Code
03-000139-23-04	418MHz	ASK	None	Medical 1
03-000139-23-05	418MHz	ASK	None	Home Sec. 1
03-000139-31-01	916.5MHz	Optional	None	Basic Demo
03-000139-31-02	916.5MHz	Optional	None	SSI WAMS
03-000139-31-03	916.5MHz	Optional	None	S&G Code
03-000139-31-04	916.5MHz	Optional	None	Medical 1
03-000139-31-05	916.5MHz	Optional	None	Home Sec. 1
03-000139-32-01	916.5MHz	OOK	None	Basic Demo
03-000139-32-02	916.5MHz	OOK	None	SSI WAMS
03-000139-32-03	916.5MHz	OOK	None	S&G Code
03-000139-32-04	916.5MHz	OOK	None	Medical 1
03-000139-32-05	916.5MHz	OOK	None	Home Sec. 1
03-000139-33-01	916.5MHz	ASK	None	Basic Demo
03-000139-33-02	916.5MHz	ASK	None	SSI WAMS
03-000139-33-03	916.5MHz	ASK	None	S&G Code
03-000139-33-04	916.5MHz	ASK	None	Medical 1
03-000139-33-05	916.5MHz	ASK	None	Home Sec. 1

FIG. 7B

Replacement Sheet

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-06-01	433.92MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-06-02	433.92MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-06-03	433.92MHz	Optional	13.56MHz Unc	S&G Code
03-000139-06-04	433.92MHz	Optional	13.56MHz Unc	Medical 1
03-000139-06-05	433.92MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-07-01	433.92MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-07-02	433.92MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-07-03	433.92MHz	OOK	13.56MHz Unc	S&G Code
03-000139-07-04	433.92MHz	OOK	13.56MHz Unc	Medical 1
03-000139-07-05	433.92MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-08-01	433.92MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-08-02	433.92MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-08-03	433.92MHz	ASK	13.56MHz Unc	S&G Code
03-000139-08-04	433.92MHz	ASK	13.56MHz Unc	Medical 1
03-000139-08-05	433.92MHz	ASK	13.56MHz Unc	Home Sec. 1
03-000139-16-01	303.825MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-16-02	303.825MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-16-03	303.825MHz	Optional	13.56MHz Unc	S&G Code
03-000139-16-04	303.825MHz	Optional	13.56MHz Unc	Medical 1
03-000139-16-05	303.825MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-17-01	303.825MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-17-02	303.825MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-17-03	303.825MHz	OOK	13.56MHz Unc	S&G Code
03-000139-17-04	303.825MHz	OOK	13.56MHz Unc	Medical 1
03-000139-17-05	303.825MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-18-01	303.825MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-18-02	303.825MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-18-03	303.825MHz	ASK	13.56MHz Unc	S&G Code
03-000139-18-04	303.825MHz	ASK	13.56MHz Unc	Medical 1
03-000139-18-05	303.825MHz	ASK	13.56MHz Unc	Home Sec. 1

FIG. 7C

Replacement Sheet

TRANSPONDER FREQUENCY, POLLING, AND FIRMWARE OPTIONS

Part Number	Frequency	Modulation	Polling	Firmware
03-000139-26-01	418MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-26-02	418MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-26-03	418MHz	Optional	13.56MHz Unc	S&G Code
03-000139-26-04	418MHz	Optional	13.56MHz Unc	Medical 1
03-000139-26-05	418MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-27-01	418MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-27-02	418MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-27-03	418MHz	OOK	13.56MHz Unc	S&G Code
03-000139-27-04	418MHz	OOK	13.56MHz Unc	Medical 1
03-000139-27-05	418MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-28-01	418MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-28-02	418MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-28-03	418MHz	ASK	13.56MHz Unc	S&G Code
03-000139-28-04	418MHz	ASK	13.56MHz Unc	Medical 1
03-000139-28-05	418MHz	ASK	13.56MHz Unc	Home Sec. 1
03-000139-36-01	916.5MHz	Optional	13.56MHz Unc	Basic Demo
03-000139-36-02	916.5MHz	Optional	13.56MHz Unc	SSI WAMS
03-000139-36-03	916.5MHz	Optional	13.56MHz Unc	S&G Code
03-000139-36-04	916.5MHz	Optional	13.56MHz Unc	Medical 1
03-000139-36-05	916.5MHz	Optional	13.56MHz Unc	Home Sec. 1
03-000139-37-06	916.5MHz	OOK	13.56MHz Unc	Basic Demo
03-000139-37-07	916.5MHz	OOK	13.56MHz Unc	SSI WAMS
03-000139-37-08	916.5MHz	OOK	13.56MHz Unc	S&G Code
03-000139-37-09	916.5MHz	OOK	13.56MHz Unc	Medical 1
03-000139-37-10	916.5MHz	OOK	13.56MHz Unc	Home Sec. 1
03-000139-38-01	916.5MHz	ASK	13.56MHz Unc	Basic Demo
03-000139-38-02	916.5MHz	ASK	13.56MHz Unc	SSI WAMS
03-000139-38-03	916.5MHz	ASK	13.56MHz Unc	S&G Code
03-000139-38-04	916.5MHz	ASK	13.56MHz Unc	Medical 1
03-000139-38-05	916.5MHz	ASK	13.56MHz Unc	Home Sec. 1

FIG. 7D

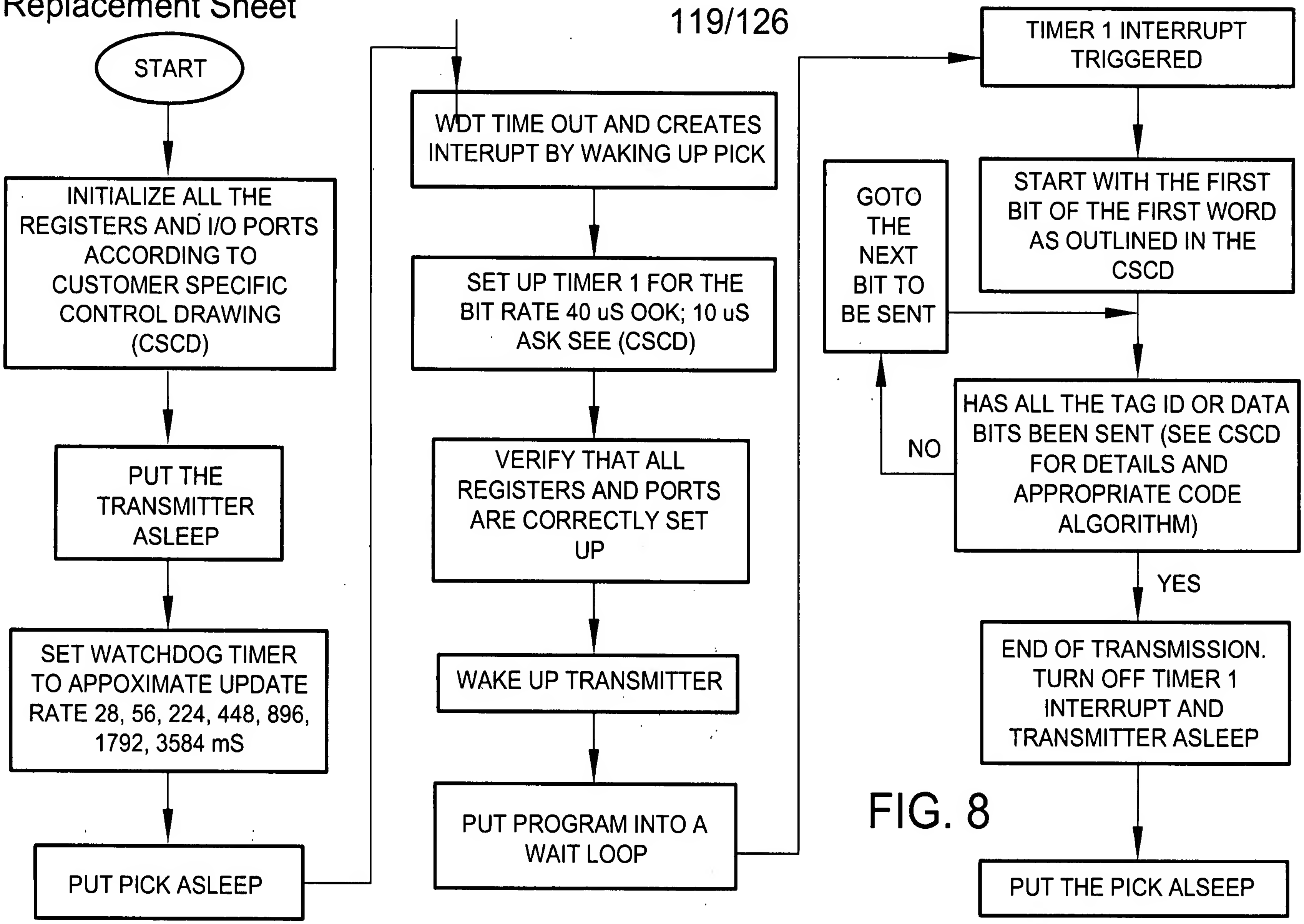

START
INITIALIZE ALL THE REGISTERS AND I/O PORTS ACCORDING TO CUSTOMER SPECIFIC CONTROL DRAWING (CSCD)
PUT THE TRANSMITTER ASLEEP
SET WATCHDOG TIMER TO APPOXIMATE UPDATE RATE 28, 56, 224, 448, 896, 1792, 3584 mS
PUT PICK ASLEEP
WDT TIME OUT AND CREATES INTERUPT BY WAKING UP PICK
SET UP TIMER 1 FOR THE BIT RATE 40 uS OOK; 10 uS ASK SEE (CSCD)
VERIFY THAT ALL REGISTERS AND PORTS ARE CORRECTLY SET UP
WAKE UP TRANSMITTER
PUT PROGRAM INTO A WAIT LOOP
TIMER 1 INTERRUPT TRIGGERED
START WITH THE FIRST BIT OF THE FIRST WORD AS OUTLINED IN THE CSCD
HAS ALL THE TAG ID OR DATA BITS BEEN SENT (SEE CSCD FOR DETAILS AND APPROPRIATE CODE ALGORITHM)
NO
GOTO THE NEXT BIT TO BE SENT
YES
END OF TRANSMISSION. TURN OFF TIMER 1 INTERRUPT AND TRANSMITTER ASLEEP
PUT THE PICK ALSEEP

FIG. 8

Replacement Sheet

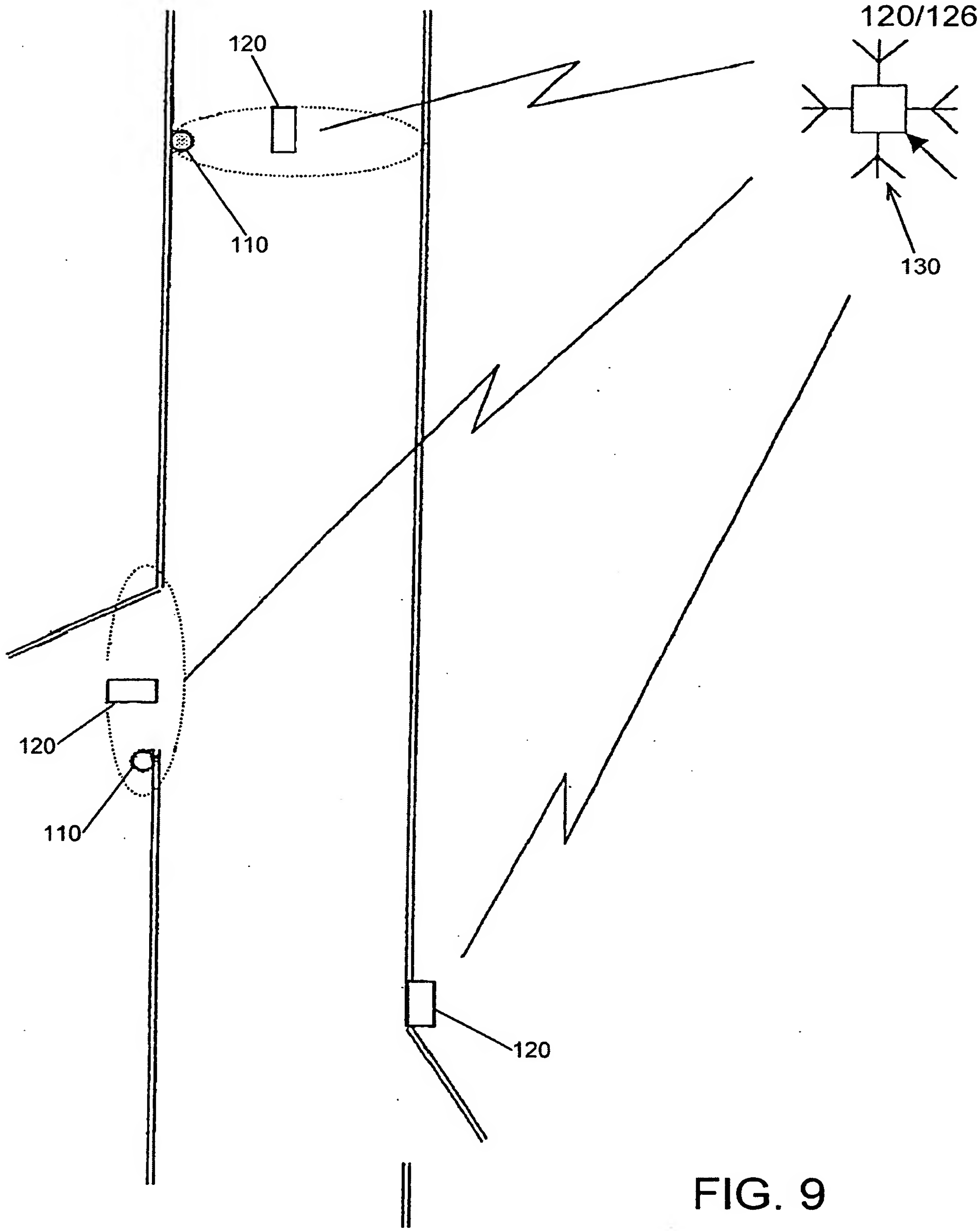


FIG. 9

TRANSPONDER TRANSMISSION PERIODICITY DECISION TABLE

Example of a Sensor Sampling Plan (Truck Wheel Monitoring)

Step 1	Wake up every 2 seconds, take 3 samples, average closest two readings, store in A
Step 2	Wake up every 2 seconds, move store A to store B, take 3 samples, average closest two readings, store in A
Step 3	Wake up every 2 seconds, move store B to store C, move store A to store B, take 3 samples, average closest two readings, store in A
Step 4	Compare value of data stored in A with limit table and react accordingly
Step 5	Average the averages stored in A, B and C and store in D
Step 6	Compare value of data stored in A with data stored in B, check change with Rate of Change Table and react accordingly
Step 7 plus	Continue to repeat steps 3 through 6 indefinitely

Example of a Limit Table (Truck Wheel Monitoring)

Normal pluslminus	Convert every	Transmit every	Repeat ea Tx	
0 to 12.5%	300 secs	300 secs	3 times	
12.5 to 25%	90 secs	90 secs	6 times	Warn
25 to 50%	30 secs	30 secs	25 times	Alert
over 50%	10 secs	10 secs	50 times	Alarm

FIG 10A

Example of Rate of Change Table (Truck Wheel Monitoring)

Change greater than	Convert every	Transmit every	Repeat ea Tx	Action
0%	450 secs	900 secs	3 times	
6.25%	150 secs	300 secs	6 times	Warn
12.50%	90 secs	90 secs	12 times	Alert 1
25%	30 secs	30 secs	25 times	Alert 2
50%	10 secs	10 secs	50 times	Alarm

Note: Each sensed parameter is analysed and the response is determined for each parameter. However the data transmission periodicity and repetition is determined by the most critical parameter (the transmission format is always the same).

FIG 10B

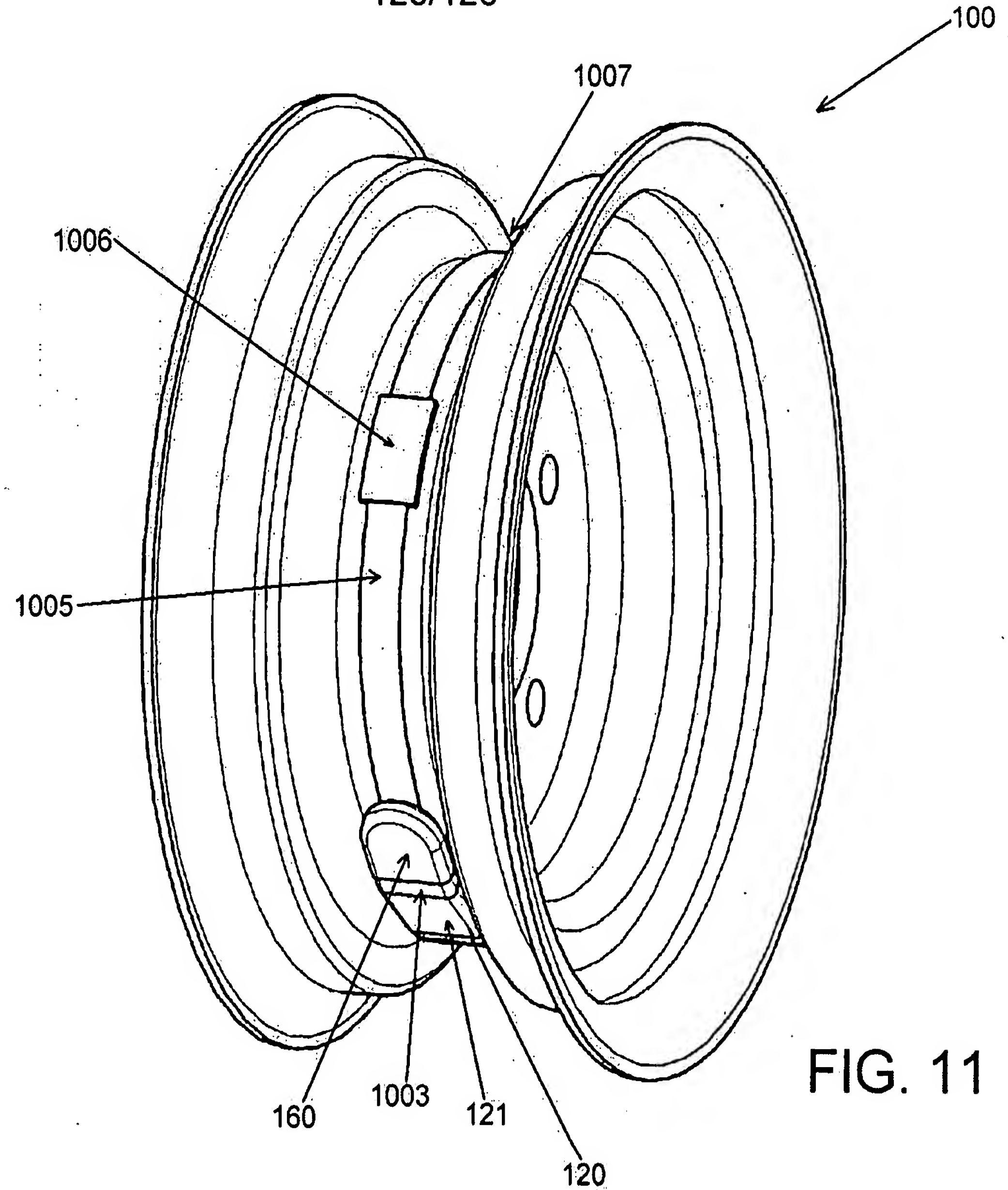


FIG. 11

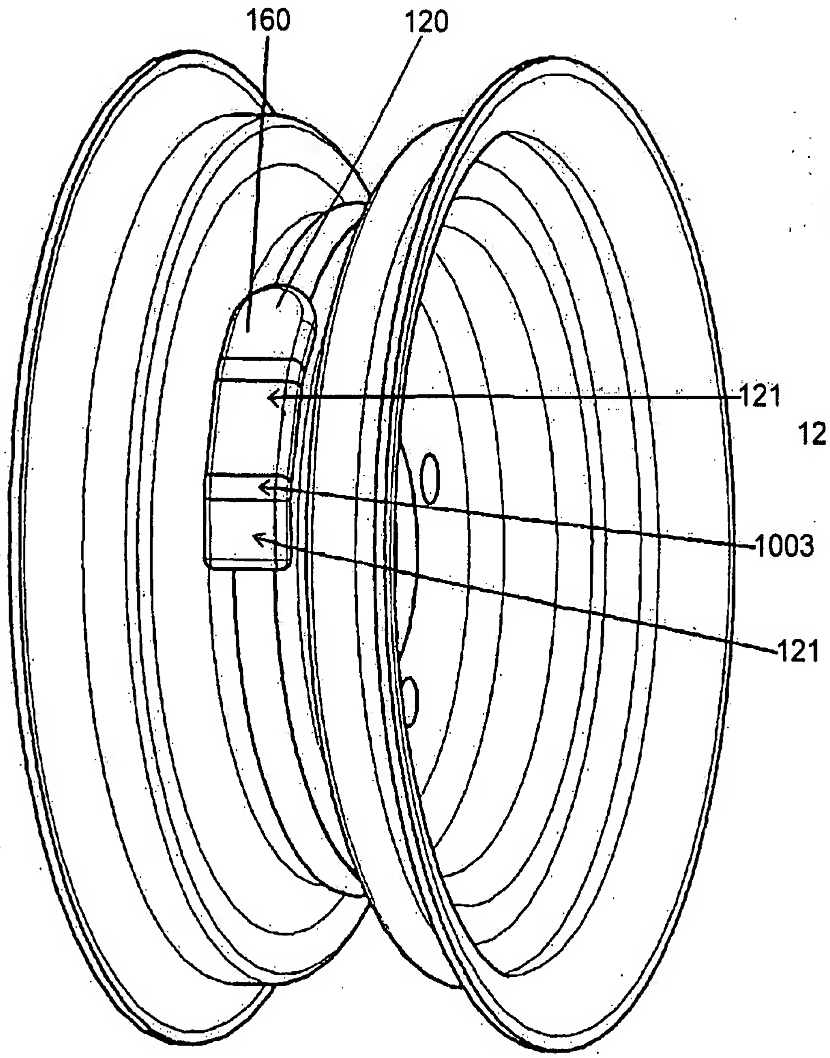


FIG. 12A

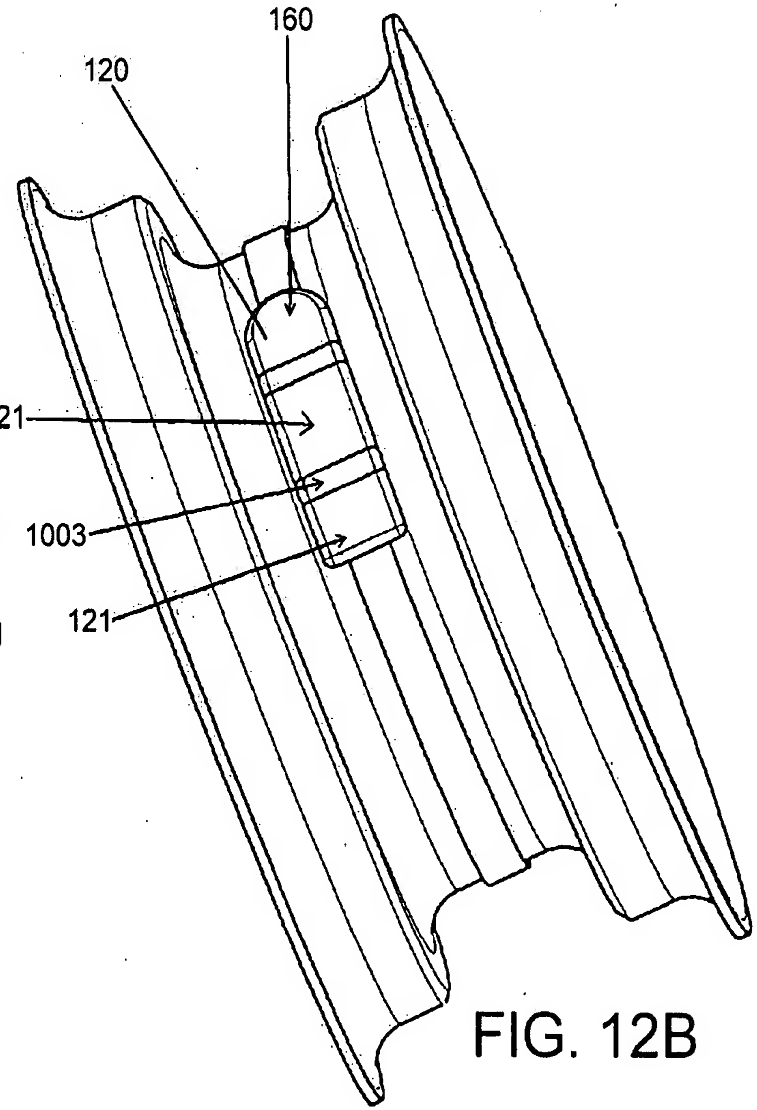


FIG. 12B

Replacement Sheet

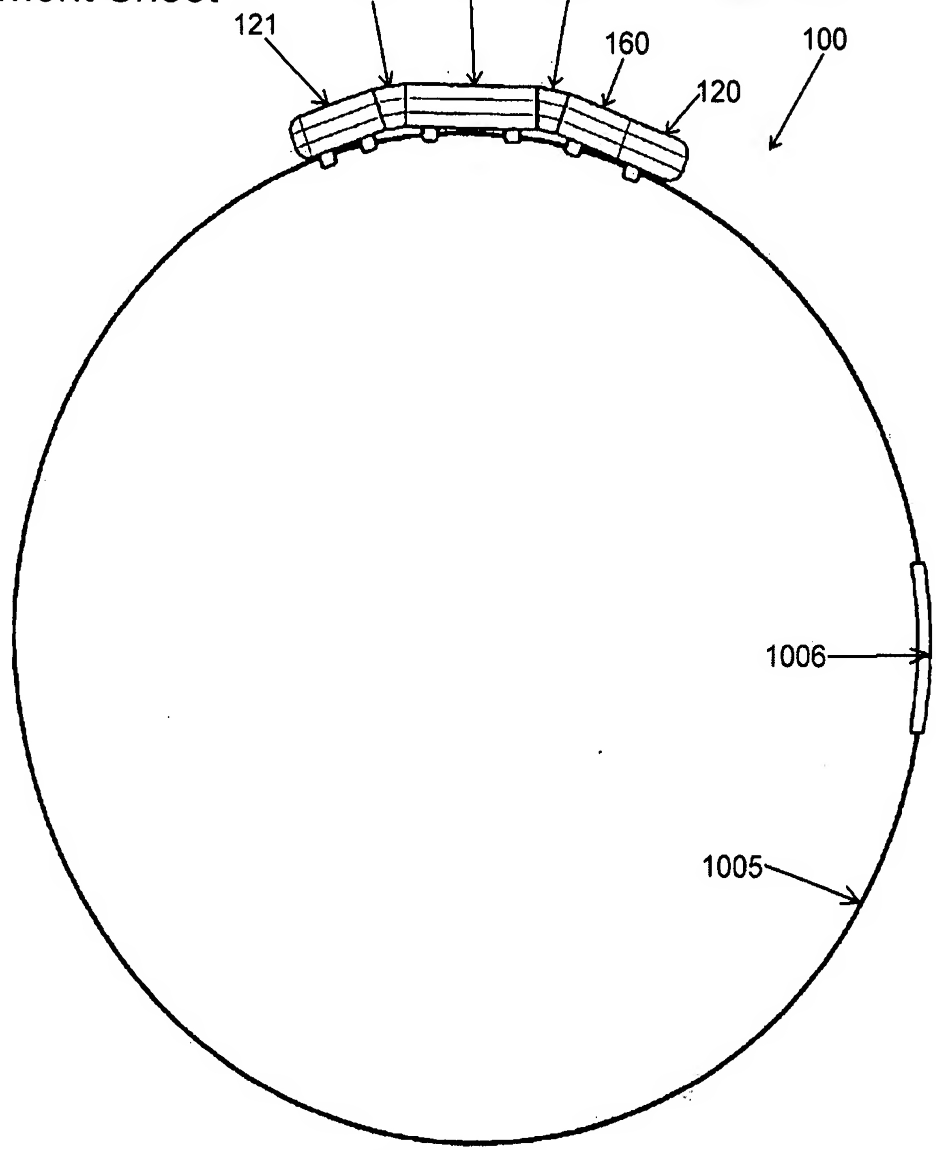


FIG. 13A

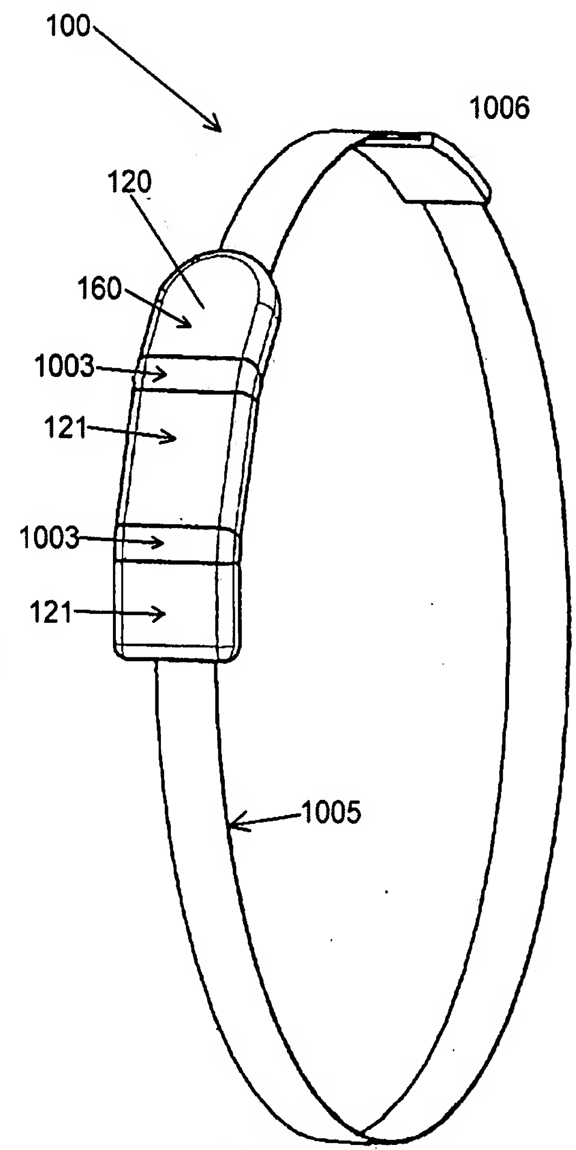


FIG. 13B

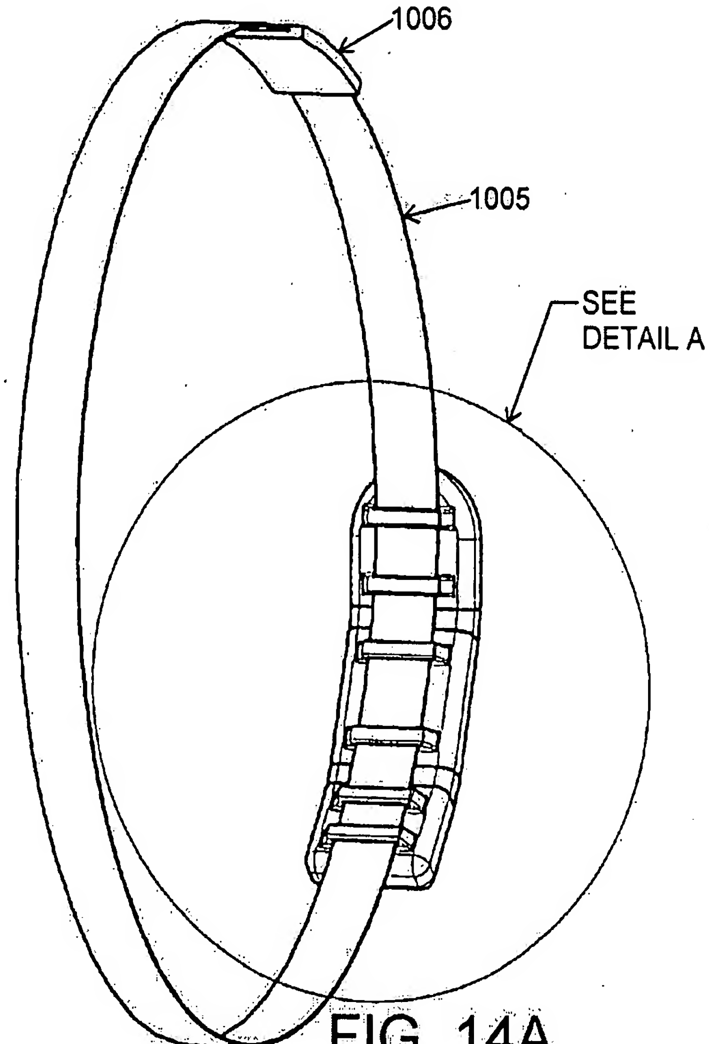


FIG. 14A

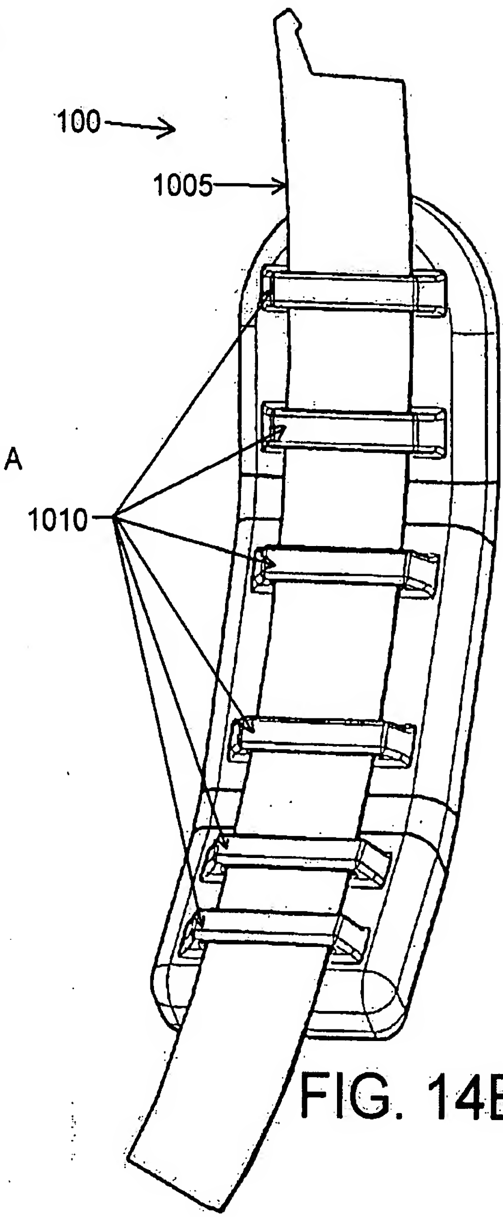


FIG. 14B